

Naval Audit Service



Audit Report



Consideration of Hazardous Noise in the Acquisition of Selected Major Department of the Navy Weapon Systems and Platforms

This report contains information exempt from release under the Freedom of Information Act. Exemption (b)(6) applies.

~~Releasable outside the Department of the Navy~~
~~only on approval of the Auditor General of the Navy~~

N2010-0038
22 June 2010

Obtaining Additional Copies

To obtain additional copies of this report, please use the following contact information:

Phone: (202) 433-5757
Fax: (202) 433-5921
E-mail: NAVAUDSVC.FOIA@navy.mil
Mail: Naval Audit Service
Attn: FOIA
1006 Beatty Place SE
Washington Navy Yard DC 20374-5005

Providing Suggestions for Future Audits

To suggest ideas for or to request future audits, please use the following contact information:

Phone: (202) 433-5840 (DSN 288)
Fax: (202) 433-5921
E-mail: NAVAUDSVC.AuditPlan@navy.mil
Mail: Naval Audit Service
Attn: Audit Requests
1006 Beatty Place SE
Washington Navy Yard DC 20374-5005

Naval Audit Service Web Site

To find out more about the Naval Audit Service, including general background, and guidance on what clients can expect when they become involved in research or an audit, visit our Web site at:

<http://secnavportal.donhq.navy.mil/navalauditservices>



DEPARTMENT OF THE NAVY
NAVAL AUDIT SERVICE
1006 BEATTY PLACE SE
WASHINGTON NAVY YARD, DC 20374-5005

7510
N2007-NIA000-0066
22 Jun 10

MEMORANDUM FOR ASSISTANT SECRETARY OF THE NAVY (RESEARCH,
DEVELOPMENT, AND ACQUISITION)
CHIEF OF NAVAL OPERATIONS
DEPUTY CHIEF OF NAVAL OPERATIONS FOR
INTEGRATION OF CAPABILITIES AND
RESOURCES (N8)
COMMANDANT OF THE MARINE CORPS

Subj: **CONSIDERATION OF HAZARDOUS NOISE IN THE ACQUISITION OF
SELECTED MAJOR DEPARTMENT OF THE NAVY WEAPON
SYSTEMS AND PLATFORMS (AUDIT REPORT N2010-0038)**

Ref: (a) NAVAUDSVC memo N2007-NIA-0066.000, dated 10 Aug 2007
(b) SECNAV Instruction 7510.7F, "Department of the Navy Internal Audit"

1. The report provides results of the subject audit announced in reference (a). Section A of this report provides our findings and recommendations, summarized management responses, and our comments on the responses. Section B provides the status of the recommendations. The full text of management responses is included in the Appendixes. The action commands for each recommendation are shown in the table below.

Command	Finding No.	Recommendation No.
Assistant Secretary of the Navy (Research, Development, and Acquisition)	1, 2	1, 6 - 14, 15
Chief of Naval Operations	1	2 - 3
Deputy Chief of Naval Operations for Integration of Capabilities and Resources (N8)	1	15
Commandant of the Marine Corps	1, 2	4, 5, 15

2. Actions planned by the Office of the Assistant Secretary of the Navy (Research, Development, and Acquisition) (OASN (RD&A)) meet the intent of Recommendations 1 and 6-14. These recommendations are considered open pending completion of the planned corrective actions, and are subject to monitoring in accordance with reference (b). Although the final target completion dates for Recommendations 8 through 14 have yet to be determined, management indicated they would provide an interim status report, along with final target completion dates, on the recommendations by 30 December 2010. For all of the recommendations, management should provide a

Subj: **CONSIDERATION OF HAZARDOUS NOISE IN THE ACQUISITION OF
SELECTED MAJOR DEPARTMENT OF THE NAVY WEAPON
SYSTEMS AND PLATFORMS (AUDIT REPORT N2010-0038)**

written status report on the recommendations within 30 days after the final target completion dates.

3. Although OASN (RD&A) was not originally an action command for Recommendation 15, they have planned corrective action which meets the intent of the recommendation. Therefore, we consider OASN (RD&A), Deputy Chief of Naval Operations for Integration of Capabilities and Resources (N8), and Commandant of the Marine Corps to be the action commands for this recommendation. This recommendation is considered open, with an interim report and final target date to be provided by management by 30 December 2010.

4. The Office of the Chief of Naval Operations did not respond to Recommendations 2 and 3, and these recommendations are considered undecided and are being resubmitted to the Chief of Naval Operations for action. In accordance with reference (b), the Office of the Chief of Naval Operations should provide comments on the undecided recommendations within 30 days; management may comment on other aspects of the report, if desired.

5. Actions planned by the Marine Corps in response to Recommendations 4 and 5 meet the intent of the recommendations. These recommendations are considered open pending completion of the planned corrective actions, and are subject to monitoring in accordance with reference (b). Because the final target completion dates for Recommendations 4 and 5 are more than 6 months in the future, the Marine Corps indicated they will provide an interim status report on the recommendations by 4 July 2010.

6. Please provide all correspondence to the Assistant Auditor General for Installations and Environment Audits, XXXXXXXXXXXXXXXXXXXXXXXXXX, with a copy to the Director, Policy and Oversight, XXXXXXXXXXXXXXXXXXXXXXXXXX. Please submit correspondence in electronic format (Microsoft Word or Adobe Acrobat file), and ensure that it is on letterhead and includes a scanned signature.

FOIA (b)(6)

7. Any requests for this report under the Freedom of Information Act must be approved by the Auditor General of the Navy as required by reference (b). This audit report is also subject to followup in accordance with reference (b).

8. We appreciate the cooperation and courtesies extended to our auditors.

[Redacted Signature]

XXXXXXXXXXXXXXXXXXXX
Assistant Auditor General
Installations and Environment Audits

FOIA (b)(6)

**Subj: CONSIDERATION OF HAZARDOUS NOISE IN THE ACQUISITION OF
SELECTED MAJOR DEPARTMENT OF THE NAVY WEAPON
SYSTEMS AND PLATFORMS (AUDIT REPORT N2010-0038)**

Copy to:

UNSECNAV

DCMO

OGC

ASSTSECNAV FMC

ASSTSECNAV FMC (FMO)

ASSTSECNAV IE

ASSTSECNAV MRA

CNO (VCNO, DNS-33, DCNO (N4), N4B, N41, N09FB)

CMC (ACMC)

COMFLTFORCOM

DON CIO

NAVINSGEN (NAVIG-4)

AFAA/DO

AAA (AUDGEN)

Table of Contents

EXECUTIVE SUMMARY	1
Overview	1
Reason for Audit.....	2
Noteworthy Accomplishments	3
Conclusions	3
Corporate-Level Efforts	3
Program-Level Efforts.....	4
Communication with Management	5
Federal Managers’ Financial Integrity Act.....	5
Corrective Actions.....	6
 SECTION A FINDINGS, RECOMMENDATIONS, AND CORRECTIVE ACTIONS	 9
 Finding 1: Department of the Navy’s Efforts to Mitigate Exposure to Hazardous Noise	 9
Synopsis.....	9
Discussion of Details	10
Background and Pertinent Guidance.....	10
Audit Results	11
Program-Level Efforts.....	12
Corporate-Level Efforts	12
<i>ONR</i>	13
<i>NAVSEA</i>	14
<i>NAVAIR</i>	15
<i>MARCORSYSCOM</i>	16
<i>DASN (S) Global War on Noise Initiative</i>	17
<i>NRAC</i>	17
Need for a Corporate Approach	18
Recommendations and Corrective Actions	20
 Finding 2: Acquisition Program Office Noise Mitigation Process	 23
Synopsis.....	23
Background.....	24
Audit Results	25
Official Identification of Hazards	25
System Safety Design Order of Precedence.....	26
Risk Categories and Risk Acceptance Authority Levels	27
Assignment of Risk Assessment Codes	29
Tracking of Hazards and Residual Mishap Risk.....	31
Overall Effect	32
Recommendations and Corrective Actions	32

SECTION B STATUS OF RECOMMENDATIONS	40
EXHIBIT A: BACKGROUND	43
CVN 78 Aircraft Carrier	43
Expeditionary Fighting Vehicle.....	44
F/A-18E/F and EA-18G.....	45
Joint Strike Fighter	46
Small Business Innovative Research Program	46
EXHIBIT B: SCOPE AND METHODOLOGY.....	48
Program Manager, Ship (PMS 378) - CVN 78 Aircraft Carrier	49
EFV Program Office - Expeditionary Fighting Vehicle.....	49
Program Manager, Air (PMA 265) - F/A-18E/F and EA-18G.....	49
JSF Program Office (JPO) - Joint Strike Fighter.....	50
EXHIBIT C: PERTINENT GUIDANCE	51
EXHIBIT D: ACTIVITIES VISITED AND/OR CONTACTED	55
EXHIBIT E: HEARING PROTECTION SUITE	57
EXHIBIT F: CENTER FOR NAVAL ANALYSES VETERANS HEARING LOSS DISABILITY COSTS	58
EXHIBIT G: RISK MATRICES	59
APPENDIX 1: MANAGEMENT RESPONSE FROM OFFICE OF THE ASSISTANT SECRETARY OF THE NAVY (RESEARCH, DEVELOPMENT AND ACQUISITION) .	60
APPENDIX 2: MANAGEMENT RESPONSE FROM DEPUTY CHIEF OF NAVAL OPERATIONS, INTEGRATION OF CAPABILITIES AND RESOURCES (N8).....	66
APPENDIX 3: MANAGEMENT RESPONSE FROM COMMANDANT OF THE MARINE CORPS	68

Executive Summary

Overview

On 8 June 2007, the Deputy Assistant Secretary of the Navy for Safety (DASN (S)) expressed that the Department of the Navy (DON) “...continue[s] to design and procure weapon systems that expose our personnel to levels of noise that even with the most advanced personal noise attenuation devices available, far exceed maximum allowable Occupational Safety and Health Administration (OSHA) standards. We can and must do a better job of protecting those men and women who routinely sacrifice so much for this country.” He further stated that “...it is obvious that, if we are to resolve our escalating hearing loss problem, increased emphasis must be placed in the design and acquisition of quieter equipment and the use of more effective engineering controls to reduce ambient noise levels.”

According to Office of the Chief of Naval Operations Instruction (OPNAVINST) 5100.23G, dated 30 December 2005, potentially hazardous noise exposure to personnel occurs in areas where steady-state noise levels¹ exceed 84 decibels (dB) or where impulse noise levels² exceed 140 dB.

The Department of Defense (DoD) Military Standard (MIL-STD) 882D, dated 10 February 2000, directs the integration of environmental, safety, and health hazard management into the systems engineering process for acquisition programs. According to the standard, management of mishap risk associated with actual environmental and health hazards is directly addressed by the system safety approach. The standard defines system safety as the application of engineering and management principles, criteria, and techniques to achieve acceptable mishap risk within the constraints of operational effectiveness and suitability, time, and cost, through all phases of the system life cycle. The objective of system safety is to achieve acceptable mishap risk through a systematic approach of hazard analysis, risk assessment, and risk management.

According to the Naval Safety Center, DON machinery, aircraft, weapons, ship propulsion systems, and industrial operations contribute to a potentially noise hazardous environment, and continuous exposure to hazardous noise levels reportedly leads to hearing loss among Sailors and Marines. In addition to the personal cost to Sailors and

¹ Steady-state noise is defined in Military Handbook 1908B, dated 16 August 1999, as periodic or random variation in atmospheric pressure at audible frequencies. It may be continuous, intermittent, or fluctuating, with the sound pressure level varying over a wide range, provided such variations have a duration exceeding 1 second.

² The Military Handbook defines impulse noise as a short burst of acoustic energy consisting of either a single impulse or a series of impulses. A single impulse lasts less than 1 second, where a series of impulses may last longer than 1 second.

Marines, the economic consequences of hearing impairment to DON include: lost time and decreased productivity; loss of workers through medical disqualification; military disability settlements; retraining; and expenses related to medical treatment. The Center for Naval Analyses reported that from 1996 to 2005, total Navy and Marine Corps veterans disability costs associated with hearing loss have steadily increased. The cost in 2005 was approximately \$200.7 million (see Exhibit F).

In 2007, we began a series of audits reviewing DON's efforts to mitigate exposure to hazardous noise. We issued a series of four reports that reviewed the following acquisition programs and associated program offices' efforts to mitigate known noise hazards in accordance with applicable guidance:

- Carrier Vessel Nuclear (CVN) 78 - Program Manager, Ship (PMS) 378 (N2009-0022, 19 March 2009);
- Expeditionary Fighting Vehicle (EFV) - EFV Program Office (N2009-0002, 16 October 2008);
- F/A-18E/F and EA-18G - Program Manager, Air (PMA) 265 (N2009-0008, 31 October 2008); and
- Joint Strike Fighter (JSF) - JSF Program Office (JPO) (N2009-0013, 15 December 2008).

We focused on the following areas related to the System Safety process: official identification of hazards, system safety design order of precedence, risk categories (matrix) and risk acceptance authority levels, assignment of Risk Assessment Codes, and tracking of hazards and residual mishap risk. We issued separate audit reports and recommendations to each program office to remedy issues at the individual acquisition program level. Since the separate audit reports were issued, the program offices have taken, or are in the process of taking, corrective actions. The intent of this report is to make recommendations to remedy issues at the corporate level. The conditions discussed in this report related to these areas, were present for the period of our review from 10 August 2007 to 4 December 2009.

Reason for Audit

The objectives³ were to: (1) assess DON's corporate-level efforts to mitigate exposure to hazardous noise; and (2) verify that safety and occupational health issues were addressed

³ The original objective was to verify that safety and occupational health issues are addressed during the acquisition process of selected DON major weapon systems and platforms. The objective was changed to address the corporate-level effort made to mitigate exposure to hazardous noise and to specify the issue (noise hazard) that was assessed.

during the acquisition process of selected DON major weapon systems and platforms through efforts to mitigate the identified noise hazards, in accordance with applicable guidance.

This audit was requested by senior DON officials.

Noteworthy Accomplishments

We conducted four previous audits concerning mitigation of noise hazards in the DON acquisition process. In our previous audits, we recommended several changes which the Navy and Marine Corps have been working to implement. DON has also focused on the mitigation of noise hazards, and has taken steps to improve the acquisition and mitigation process. Details of these accomplishments can be found in Finding 1 of this report.

Conclusions

We found that DON did not have a sufficient process in place to effectively address mitigation of hazardous noise risks posed by major weapon systems. Also, the weapon systems program offices reviewed did not fully comply with requirements to mitigate identified noise hazards during the acquisition process. As a result, these conditions may contribute to a hazardous environment of high noise exposure that, according to the Naval Safety Center, ensures permanent hearing loss to Sailors and Marines. In addition to the personal cost to Sailors and Marines, the economic consequences of hearing impairment to DON include: lost time and decreased productivity; loss of workers through medical disqualification; military disability settlements; retraining; and expenses related to medical treatment.

Corporate-Level Efforts

At the time of the audit, several DON organizations were making significant individual efforts to mitigate exposure to hazardous noise risks. However, these efforts were not fully coordinated. For example, during our audit, the Marine Corps, Office of Naval Research, Naval Sea Systems Command, and Naval Air Systems Command each had separate research and development projects to address aspects of hazardous noise through the development and fielding of personal protective equipment. DON efforts were not sufficient because there was no overall corporate approach to manage efforts to mitigate exposure to hazardous noise and the resulting noise-induced hearing loss. While there was some informal collaboration between organizations to mitigate exposure to hazardous noise, there was no requirement, formal process, or structure for coordinating these efforts. We also noted the need for consistent guidance and oversight on a DON-wide level. In our opinion, DON should create a central body with responsibility for managing and coordinating efforts to mitigate exposure to hazardous noise to ensure

that appropriate actions are being taken. Examples of responsibilities for the central body could include: (1) serving as DON's advocate for noise reduction to keep focus on the issue and sustain progress already made; (2) initiating and coordinating research and development of noise reduction solutions and hearing protection; (3) coordinating efforts among DON organizations, to include leveraging promising innovations and technological solutions across all new and existing DON platforms; and/or (4) overseeing implementation of necessary guidance.

Program-Level Efforts

Our audits of four DON Acquisition Programs (CVN 78, EFV, F/A-18E/F and EA-18G, and JSF) showed that the responsible program offices could have better managed their programs to mitigate hazardous noise. Table 1 presents a snapshot of our audit results by acquisition program office and program. These opportunities for improvement occurred due to lack of appropriate policy, internal management controls, and oversight from DON organizational leadership. As a result, noise hazards may not have been properly assessed to determine appropriate and potential mitigation solutions. There also may not have been an appropriate level of visibility and awareness of the risk at higher command levels. Basing program decisions on incomplete information could lead to insufficient mitigation of noise and other hazards, contributing to a hazardous environment to Sailors and Marines.

Table 1: Audit Results by Acquisition Program Office and Program

Program Office - Program	Official Identification of Hazards	System Safety Design Order of Precedence	Risk Categories and Risk Acceptance Authority Levels	Assignment of Risk Assessment Codes	Tracking of Hazards and Residual Mishap Risk
PMS 378 - CVN 78	✗	✓	✗	✓	✗
EFV Program Office - EFV	✓	✓	✗	✗	✓
PMA 265 - F/A-18E/F and EA-18G	✓	✗	✗	✓	✗
JPO - JSF	✓	✗	✗	✗	✗

Key: ✓ = Compliance; ✗ = Non-compliance

Communication with Management

Throughout the audit, we kept management and stakeholders informed of the conditions noted. Specifically, we briefed our audit results to:

- Vice Chief of Naval Operations (VCNO) - 21 July 2009;
- Assistant Secretary of the Navy for Installations and Environment (ASN (I&E)) - 18 June 2009;
- ASN for Research, Development, and Acquisition (ASN (RD&A)), Principal Military Deputy - 29 September 2008 and 14 November 2008;
- DASN (S) - 8 May 2008 and 18 June 2009;
- DASN for Air Programs (DASN (Air)) representatives - 19 March 2008 and 12 January 2009;
- DASN for Acquisitions and Logistics Management (DASN (A&LM)) representatives – 8 September 2008 and 18 June 2009;
- OPNAV Director Air Warfare (OPNAV N88) representatives – 25 March 2008;
- OPNAV Safety Liaison Office (OPNAV N09FB) representatives – 25 March 2008 and 9 April 2008;
- The System Safety Advisory Board - 18 March 2009;
- EFV Program Office management - 5 June 2008 and 27 August 2008;
- PMS 378 management - 6 October 2008 and 27 January 2009;
- PMA 265 management - 11 June 2008;
- JPO management - 20 February 2008, 7 April 2008, 5 June 2008, 23 July 2008, 16 October 2008, and 14 November 2008; and
- Fleet representatives from Fleet Forces Command, U.S. Pacific Fleet, Naval Air Forces Safety, and Commander, Naval Air Forces - 9 April 2008.

Federal Managers' Financial Integrity Act

The Federal Managers' Financial Integrity Act (FMFIA) of 1982, as codified in Title 31, United States Code, requires each Federal agency head to annually certify the effectiveness of the agency's internal and accounting system controls.

Recommendations 1 through 15 address issues related to the internal controls over the mitigation of hazardous noise. In our opinion, the weaknesses noted in this report and the individual program reports may warrant reporting in the Auditor General's annual

FMFIA memorandum identifying management control weaknesses to the Secretary of the Navy.

Corrective Actions

To improve management of DON's efforts to mitigate exposure to hazardous noise, we recommended that ASN (RD&A) coordinate with CNO (Deputy Chief of Naval Operations (DCNO) for Fleet Readiness and Logistics (N4), DCNO (Integration of Capabilities & Resources) (N8), Commander, Fleet Forces Command, and OPNAV Safety Liaison Office (N09FB)); Commandant of the Marine Corps (CMC); and ASN (I&E) to establish a central DON body, with responsibility and authority for the actions discussed in Finding 1, to manage efforts to mitigate exposure to hazardous noise throughout DON organizations.

The Office of ASN (RD&A) (OASN (RD&A)) responded to and concurred with the recommendation. The planned corrective actions meet the intent of the recommendation, which is considered open pending completion of those actions.

We also recommended that CNO and CMC establish a plan of action and milestones to identify the earliest and most feasible opportunity, upon Sailors' and Marines' entry into service, to fit and issue the appropriate and most effective form of hearing protection to Sailors and Marines in Navy Enlisted Classifications/Military Occupational Specialties known to be exposed to hazardous noise. We also recommended that CNO establish a plan of action and milestones to fit and issue the appropriate and most effective form of hearing protection to all Sailors already in Navy Enlisted Classifications known to be exposed to hazardous noise. We recommended that the Commandant of the Marine Corps establish a plan of action and milestones to fit and issue the appropriate and most effective form of hearing protection as part of the uniform to all Marines already in Military Occupational Specialties known to be exposed to hazardous noise.

CNO did not provide an official response to the recommendations. Therefore, we consider recommendations to them to be undecided, and are resubmitting them to CNO for response.

CMC responded to and concurred with the recommendations. The planned corrective actions meet the intent of the recommendations, which are considered open pending completion of those actions.

To ensure that program offices officially identify noise hazards, we recommended that ASN (RD&A) establish internal management controls and provide oversight to verify that all acquisition programs in their purview officially identify and assess known/recognized noise hazards early in the acquisition process.

OASN (RD&A) responded to and concurred with the recommendation. The planned corrective actions meet the intent of the recommendation, which is considered open pending completion of those actions.

To ensure that acquisition program offices follow the System Safety Design Order of Precedence for mitigating noise hazards, we recommended that DCNO (Integration of Capabilities and Resources) (N8) and CMC establish a plan of action and milestones to ensure that a noise threshold/goal is established for DON acquisition programs, especially for those with known noise hazards to meet, and include the threshold/goal as a requirement in the program's Operational Requirements Documents. We recommended that ASN (RD&A) establish internal management controls and provide oversight to ensure that DON acquisition programs include these threshold/goal requirements in their respective contracts within the Materiel Solution Analysis, Technology Development, and Engineering and Manufacturing Development phases. We also recommended that ASN (RD&A) establish and implement controls and provide oversight to ensure that the System Safety Design Order of Precedence is followed during the acquisition process to ensure that, where possible, concerns, such as hazardous noise, are mitigated early in the process through system design.

DCNO (N8), CMC, and OASN (RD&A) responded to and concurred with the recommendations. The responses from DCNO (N8) and the Marine Corps, and the planned corrective actions from OASN (RD&A), meet the intent of the recommendations, which are considered open pending completion of those actions.

To ensure that program offices establish consistent risk categories and risk acceptance authority levels, we recommended that ASN (RD&A) revise Secretary of the Navy Instruction (SECNAVINST) 5000.2D to: (1) require the use of a single risk matrix with consistent risk categories and associated definitions and terms for all DON acquisition programs, or by like programs, to follow when evaluating risks; (2) establish uniform guidance for setting risk acceptance authority levels; and (3) prohibit delegation of risk acceptance authority below the Program Manager (PM) level. We also recommended that ASN (RD&A) establish controls and provide oversight early in the acquisition process to ensure that program offices properly establish risk acceptance authority levels in accordance with the revised SECNAVINST 5000.2D.

OASN (RD&A) responded to and concurred with the recommendations. The planned corrective actions meet the intent of the recommendations, which are considered open pending completion of those actions.

To ensure that acquisition program offices properly assign Risk Assessment Codes (RACs), we recommended that ASN (RD&A) promulgate policy to require, or revise existing policy that requires: (1) DON acquisition programs to comply with MIL-STD 882D, Appendix A, related to sections that provide guidance to properly assign RACs and establish controls to ensure compliance; (2) DON acquisition programs to assign an

initial RAC (prior to considering mitigation solutions) at a level with a corresponding risk acceptance authority of Component Acquisition Executive (CAE) for all noise hazards that expose Sailors and Marines to hazardous levels of noise (according to OPNAVINST 5100.23G), maintain the RAC at that level until the noise hazard is mitigated below the level considered hazardous, and, if the noise hazard is not mitigated below the level considered hazardous, require the hazard to be formally accepted by both the User Representative and the CAE prior to deployment; and (3) DON program offices to develop mitigation solutions in collaboration with end users (using organizations) and obtain formal acceptance of mitigation solutions from end-user solutions prior to reducing the RAC levels, especially when it involves changes to an end user's (e.g. Fleet command, etc.) concept of operations.

OASN (RD&A) responded to and concurred with the recommendations. The planned corrective actions meet the intent of the recommendations, which are considered open pending completion of those actions.

To ensure that program offices sufficiently track noise hazards, we recommended that ASN (RD&A) establish guidance that specifies the minimum information program offices are required to track, and establish controls to ensure that DON acquisition program offices maintain a current log of identified hazards and an assessment of residual mishap risk.

OASN (RD&A) responded to and concurred with the recommendation. The planned corrective actions meet the intent of the recommendation, which is considered open pending completion of those actions.

Section A

Findings, Recommendations, and Corrective Actions

Finding 1: Department of the Navy's Efforts to Mitigate Exposure to Hazardous Noise

Synopsis

We found that the Department of the Navy (DON) did not have a sufficient process in place to effectively address mitigation of hazardous noise risks posed by major weapon systems. As identified in a series of Naval Audit Service reports,⁴ processes for addressing hazardous noise at the program office level were not sufficient to comply with Department of Defense (DoD) system safety requirements in the majority of areas audited. For example:

- Two program offices did not follow the system safety design order of precedence by first attempting to mitigate hazardous noise through system design;
- One program office did not officially identify all known noise hazards requiring mitigation;
- Three of the program offices did not include specific thresholds/goals in the Operational Requirements Documents or contracts for known noise hazards; and
- None of the program offices audited properly assigned risk categories or risk acceptance authority levels.

At the time of the audit, several DON organizations were making significant individual efforts to mitigate exposure to hazardous noise. However, these efforts were not fully coordinated. For example, during the audit, the Marine Corps, Office of Naval Research (ONR), Naval Sea Systems Command (NAVSEA), and Naval Air Systems Command (NAVAIR) each had separate research and development projects to address hazardous noise through the development and fielding of personal protective equipment. DON efforts to mitigate hazardous noise risk were not sufficient because there was no overall corporate approach to manage efforts to mitigate exposure to hazardous noise and the

⁴ "Consideration of Hazardous Noise and Vibration in the Acquisition of the Expeditionary Fighting Vehicle," N2009-0002, 16 October 2008; "Consideration of Hazardous Noise in the Acquisition of the F/A-18E/F Super Hornet and EA-18G Growler Strike Fighter Variants," N2009-0008, 31 October 2008; "Consideration of Hazardous Noise in the Acquisition of the Joint Strike Fighter," N2009-0013, 15 December 2008; and "Consideration of Hazardous Noise in the Acquisition of the CVN 78 Aircraft Carrier," N2009-0022, 19 March 2009.

resulting noise-induced hearing loss. While there was some informal collaboration between organizations, there was no requirement, formal process, or structure for coordinating these efforts within DON. As an industry standard, examples where DON/DoD has established a central body to address an issue through collaboration are the Joint Guam Program Office and DoD Ergonomics Working Group. We also noted the need for consistent guidance and oversight at a DON-wide level (see Finding 2). As a result, these conditions may contribute to a hazardous environment of high noise exposure that, according to the Naval Safety Center, ensures permanent hearing loss to Sailors and Marines. In addition to the personal cost to Sailors and Marines, the economic consequences of hearing impairment to DON include: lost time and decreased productivity; loss of workers through medical disqualification; military disability settlements; retraining; and expenses related to medical treatment. In our opinion, DON should create a central body with responsibility for managing and coordinating efforts to mitigate exposure to hazardous noise to ensure that appropriate actions are being taken. Examples of responsibilities for the central body could include: (1) serving as DON's advocate for noise reduction to keep focus on the issue and sustain progress already made; (2) initiating and coordinating research and development of noise reduction solutions and hearing protection; (3) coordinating efforts among DON organizations, to include leveraging promising innovations and technological solutions across all new and existing DON platforms; and/or (4) overseeing implementation of necessary guidance.

Discussion of Details

Background and Pertinent Guidance

The DoD Military Standard (MIL-STD) 882D, dated 10 February 2000, directs the integration of environmental, safety, and health hazard management into the systems engineering process for acquisition programs. According to the standard, management of mishap risk associated with actual environmental and health hazards is directly addressed by the system safety approach. The standard defines system safety as the application of engineering and management principles, criteria, and techniques to achieve acceptable mishap risk within the constraints of operational effectiveness and suitability, time, and cost, through all phases of the system life cycle. The objective of system safety is to achieve acceptable mishap risk through a systematic approach of hazard analysis, risk assessment, and risk management.

According to Military Handbook 1908B, dated 16 August 1999, steady-state noise is defined as a periodic or random variation in atmospheric pressure at audible frequencies. It may be continuous, intermittent, or fluctuating, with the sound pressure level varying over a wide range, provided such variations have a duration exceeding 1 second. The Handbook defines impulse noise as a short burst of acoustic energy consisting of either a

single impulse or a series of impulses. A single impulse lasts less than 1 second, where a series of impulses may last longer than 1 second. According to Office of the Chief of Naval Operations Instruction (OPNAVINST) 5100.23G, potentially hazardous noise exposure occurs in areas where steady-state noise levels exceed 84 decibels (dB) or where impulse noise levels exceed 140 dB.

The Assistant Secretary of the Navy (Research, Development and Acquisition) (ASN (RD&A)) issued a memorandum on 22 October 2007, tasking ONR to develop and execute a series of workshops with the Systems Commands and Program Executive Officers (PEOs) to establish a roadmap of next generation hearing protection equipment and improved design efforts for quieter Naval systems. In addition, ASN (RD&A) tasked NAVAIR to develop and report recommendations to accelerate the current Flight Deck Cranial Program and recommend a plan of action and milestones to rapidly acquire and field custom molded deep insert earplugs.

ASN (Installations and Environment) (I&E) and ASN (RD&A) issued a joint memorandum on 30 October 2007, outlining efforts to reduce permanent hearing loss. The memo stated that “hearing loss prevention is a critical issue of readiness, safety, health, and quality of life that requires continuous focus and support by leaders at all levels.” The memo stated that the Assistant Secretaries were “concerned that permanent hearing loss is increasing and Naval systems continue to emit noise levels that can produce permanent hearing loss for Navy and Marine Corps personnel.” Hearing prevention efforts outlined in the memo included accelerating plans to deploy better personal protective equipment currently under development, continuing research and development into enhanced hearing protection, developing solutions to reduce noise for current and next generation Naval systems, and continuing to improve the system engineering process for future Naval system acquisition programs to ensure hearing loss prevention is included from the outset. The memo requested the acceleration of two near-term solutions: the flight deck cranial program and custom molded deep-insert earplugs.

Audit Results

The Deputy Assistant Secretary of the Navy for Safety (DASN (S)) has initiated a Global War on Noise, and several DON organizations have ongoing efforts to mitigate hazardous noise risks. However, program-level efforts were not sufficient. In addition, there was no corporate-level approach or oversight, individual organization efforts were not organized, and overall DON did not have a sufficient process in place to effectively address, in a sustainable way, mitigation of hazardous noise risks posed by major weapon systems. This occurred because there was no central body over the hazardous noise issue to ensure that appropriate actions were being taken to address and mitigate the issue. As

a result, Sailors and Marines may be placed at risk of permanent hearing loss, and DON may be missing opportunities to share information. Furthermore, the Center for Naval Analyses reported that from 1996 to 2005, total Navy and Marine Corps veterans disability costs associated with hearing loss have steadily increased. The cost in 2005 was approximately \$200.7 million (see Exhibit F). Details follow.

Program-Level Efforts

Naval Audit Service performed four audits and found material issues related to the consideration of hazardous noise in the acquisition of four major Navy and Marine Corps weapon systems: Carrier Vessel Nuclear (CVN) 78 Aircraft Carrier; the Expeditionary Fighting Vehicle (EFV); F/A-18E/F Super Hornet and EA-18G Growler Strike Fighter Variants; and Joint Strike Fighter (JSF). As shown in Table 1 on page 4, and detailed in Finding 2, the efforts of program offices were not, in all instances, sufficient to meet requirements. We found instances of noncompliance in the areas of: (1) official identification of hazards, (2) following the system safety design order of precedence, (3) using standard risk terminology and categories (matrix) and risk acceptance authority levels, (4) assignment of Risk Assessment Codes (RACs), and (5) tracking of hazards and residual mishap risk. We also noted that specific thresholds/goals were not included in the Operational Requirements Documents (ORDs) or contracts for known noise hazards for three of the four programs.

Corporate-Level Efforts

Although several major commands had initiatives to mitigate the risks of hazardous noise posed by major weapon systems, the efforts across DON were not organized at the corporate-level. For example, during our audit, the Marine Corps, ONR, NAVSEA, and NAVAIR each had separate research and development projects for the development and fielding of personal protective equipment. We also noted the need for consistent policy guidance and oversight on a DON-wide level (see Finding 2).

The main DON organizations involved in noise reduction and hearing protection research and development efforts are ONR; PEOs and Program Offices; the OPNAV Safety Liaison Office (N09FB); ASN (I&E); DASN (S); ASN (RD&A) as Acquisition Executive; and Systems Commands, which include NAVSEA, NAVAIR, and Marine Corps Systems Command (MARCORSYSCOM). In addition to these research and development efforts, over the course of the audit, the Global War on Noise initiative and the Naval Research Advisory Committee (NRAC) Jet Engine Noise Reduction Study were being conducted.

ONR

The primary ONR effort to mitigate exposure to hazardous noise was the Noise-Induced Hearing Loss (NIHL) Program. It was established on 23 April 2008, as a result of a 22 October 2007 ASN (RD&A) memorandum tasking ONR to develop and execute a series of workshops with the Systems Commands and PEOs to establish a roadmap of next-generation hearing protection equipment and improved design efforts for quieter Naval systems. According to the ONR Comptroller Office, from Fiscal Years (FYs) 2007-2009, the NIHL program awarded approximately \$6.7 million for the on-going NIHL efforts. The efforts of the NIHL Program fall into four main research areas, as shown in Table 2.

Table 2: On-going ONR NIHL Program Efforts

Research Area	Efforts
Noise Reduction	<ul style="list-style-type: none"> • Jet engine noise reduction
Personal Protective Equipment	<ul style="list-style-type: none"> • Capability to capture ear canal shapes for design and manufacture of deep insert custom earplugs • Personal noise exposure measurement capability
Noise Incidence, Susceptibility, and Evaluation	<ul style="list-style-type: none"> • NIHL prediction tool to estimate the incidence of hearing loss and its economic costs • Systems approach to reduce personnel exposure risk for NIHL and tinnitus • Hearing loss simulator for use in hearing conservation program
Medical Prevention and Treatment	<ul style="list-style-type: none"> • Effective medical treatments for acute acoustic trauma • Pharmacological and surgical means to regenerate sensory hair cells • Potential treatments for human blast injury

Previous ONR Code 34 efforts (FYs 2004 to 2007) included demonstrating hearing loss simulator technology for use in hearing conservation training, developing improved aviation personnel hearing protection, evaluating materials for development of an improved aviator headgear hearing protection system, and researching medical efforts to prevent and treat the effects of noise on hearing loss. According to the ONR Comptroller Office, ONR Code 34 awarded approximately \$6.7 million for these efforts.

ONR organized and participated in several NIHL workshops with representatives from ASN (RD&A), ASN (I&E), NAVAIR, NAVSEA, U.S. Fleet Forces Command (FFC), the Marine Corps, and commands from other Services, as a result of the tasking in the 22 October 2007 ASN (RD&A) memo. These workshops resulted in an ONR total systems engineering approach to address NIHL and a comprehensive list of recommendations, dated 23 April 2008, for DON-wide consideration, including

immediate, short-term, mid-term, and long-term efforts for noise reduction, preventing and treating NIHL, and personal protective equipment. One recommendation for immediate action to prevent and treat NIHL was to implement policy to mandate the use of personal protective equipment as part of the uniform for Navy and Marine Corps personnel. According to an ONR representative, as of 14 May 2009, he was unaware of any actions taken to address this recommendation.

The Marine Corps did issue a change to the Marine Corps Uniform Regulations on 15 February 2006, which states that Marines in training or combat environments are required to carry double-ended Combat Arms Earplugs as part of their tactical combat utility uniform. While the updated guidance addresses the use of hearing protection as part of the uniform in training and combat environments, it does not address the need for issuance of advanced hearing protection to Marines assigned to Military Occupational Specialties that are known to be exposed to hazardous noise. In our opinion, at the earliest and most feasible opportunity upon their entry into service, DON should fit and issue the most appropriate and most effective form of personal hearing protection devices to Sailors and Marines assigned to Navy Enlisted Classifications/Military Occupational Specialties that are known to be exposed to hazardous noise.

NAVSEA

NAVSEA developed a computerized ship noise prediction and analysis tool, and at the time of this audit, had developed, and was in the process of fielding, advanced hearing protection for use on Littoral Combat Ships (LCS). In addition, at the time of our audit, NAVSEA was researching the possibility of incorporating insulation on ships to reduce hazardous noise.

The computerized noise prediction and analysis tool was developed by NAVSEA to more accurately handle various airborne noise control issues. According to the NAVSEA "Human Systems Integration Directorate Advanced Hearing Protection Concepts Status Report for PEO Ships," dated 10 December 2008, noise prediction models were used on the LCS 1 (*USS Freedom*) and LCS 2 (*USS Independence*) in order to identify high-noise areas and recommend optimal noise abatement approaches. According to a NAVSEA representative, use of the tool proved to be successful, as the noise levels on the LCS 2 are lower than those on the LCS 1. NAVSEA reportedly spent \$1.55 million between FYs 1998 and 2003 for development of the noise prediction and analysis tool;⁵ the cost estimate for the use of the noise prediction and analysis tool for the LCS efforts was \$80,000.⁶

⁵ According to the Navy Small Business Innovative Research (SBIR) Web site (see Exhibit A for background on the SBIR program).

⁶ According to a NAVSEA "Human Systems Integration Directorate Advanced Hearing Protection Concepts Status Report," dated 1 December 2008.

At the time of the audit, NAVSEA had developed, and was in the process of fielding, advanced hearing protection for use on LCS ships. The advanced hearing protection is a suite of custom molded earplugs, which includes regular custom molded earplugs, communication earplugs, and sleep earplugs. According to the NAVSEA Status Report, dated 1 December 2008, the custom molded earplugs and communication earplugs provide 29 decibels (dB) of attenuation, while the sleep earplugs provide 9 dB of attenuation. A NAVSEA representative informed us the custom molded earplugs were issued to 50 percent of the LCS 1 crew in September 2008, and 50 percent of the LCS 2 crew will also receive the custom molded earplugs. According to the NAVSEA Status Report, the cost estimate for the custom molded earplugs, ear impressions, and training for both LCS 1 and LCS 2 crews was \$100,000, and the estimate for crew audiological baselines and two 6-month follow up assessments was \$230,000.

In addition, at the time of our audit, NAVSEA was researching the possibility of incorporating insulation on ships to reduce hazardous noise. According to the Navy SBIR Web site, NAVSEA spent \$806,059 between FYs 2005 and 2009 for the research effort.

NAVAIR

NAVAIR efforts included development of hearing protection and communication devices, as well as research of propulsion noise reduction efforts. According to a NAVAIR representative, research on hearing protection devices began in 2002. Between FYs 2002 and 2009, NAVAIR awarded \$16.97 million to develop hearing protection and communication technologies.⁷ At the time of our review, test results supported that the advanced hearing protection provided at least 43 dB attenuation, with a reported goal of achieving up to 50 dB attenuation (see Exhibit E). A Program Manager, Air (PMA) 202 representative told us that PMA 202 completed delivery of 738 pairs of custom molded earplugs to the CVN 69 (*USS Dwight D. Eisenhower*) Aircraft Carrier crew in February 2009, and has started additional pilot programs on the CVN 75 (*USS Truman*) and CVN 77 (*USS Bush*) aircraft carriers. According to the PMA 202 representative, the custom molded earplugs will begin full rate production in FY 2010, and as of 11 June 2009, they plan to deliver 46,621 units between FYs 2010 and 2015 to Expeditionary Warfare (N85) and Air Warfare (N88) personnel, at a budgeted cost of \$71.8 million.

At the time of the audit, NAVAIR was also conducting research on propulsion noise reduction. According to NAVAIR Propulsion and Power (AIR 4.4) representatives, NAVAIR propulsion noise reduction SBIR research efforts included: gas turbine engine noise modeling, which involves developing a simulation and modeling tool to

⁷ According to the Navy SBIR Web site.

define aircraft noise footprints and predict the magnitude of the noise signature; and exhaust jet noise reduction for tactical aircraft, which will use modeling and simulations to define new approaches to the design and performance analysis of nozzle components that attenuate the exhaust jet noise. NAVAIR awarded \$2.59 million in propulsion SBIR efforts between FYs 2005 and 2008.⁸ The F/A-18 Program Office (PMA 265) coordinated with AIR 4.4 and ONR for noise reduction efforts. PMA 265 provided aircraft and engines in 2003 and 2007 for ONR/AIR 4.4 testing to establish aircraft baseline noise levels. Improved designs will be measured against these noise levels.

Additionally, PMA 265, in coordination with AIR 4.4, conducted research on engine chevrons⁹ in order to reduce jet noise at the source. Based on documentation reviewed, PMA 265 provided two F/A-18C/D engines (F404-400 engine) to ONR in 2004 for testing of potential design solution noise mitigation initiatives, specifically the addition of chevrons on the engine nozzle. According to ONR representatives, the Rapid Technology Transition program provided \$2.05 million to support the chevron research effort. According to PMA 265, the program office plans to fund \$3.30 million for the chevron effort between FYs 2009 and 2011, and plans to request \$98.64 million from N88 between FYs 2011 and 2017, to retrofit 1,178 engines with chevrons. AIR 4.4 representatives informed us that if the chevrons prove to be a viable noise reduction solution on the F/A-18E/F and E/A-18G engines, they will determine if the chevrons can be successfully applied to other tactical aircraft engines.

In addition, according to a NAVAIR representative, NAVAIR has held quarterly workshops since 2002 to develop advanced hearing protection. NAVAIR has also held annual "Exhaust Jet Noise Reduction for Tactical Aircraft" workshops since 2006 with subject matter experts from the Government, industry, and academia to obtain their perspectives on potential alternative engineering solutions for aircraft exhaust jet noise.

MARCORSYSCOM

MARCORSYSCOM modified existing enhanced hearing protection to mitigate exposure of Marines to hazardous noise. Enhanced hearing protection is a digital, lightweight, tactical communication headset with built-in intelligent adaptive hearing protection. According to a MARCORSYSCOM representative, this enhanced hearing protection is utilized by Marines requiring radio communications capability. According to a U.S. Air Force Research Laboratory representative, the enhanced hearing protection communication headset provides 23 dB attenuation. The MARCORSYSCOM representative said that fielding of the headsets began in

⁸ According to the Navy SBIR Web site.

⁹ According to PMA 265, the addition of chevrons to an aircraft engine nozzle reduces peak velocity faster, which reduces noise. According to AIR 4.4, this is not a major redesign but a minor change in nozzle configuration.

February 2007, and 39,000 headsets have been procured to date, with an objective to field 48,000 headsets. According to the MARCORSYSCOM representative, research and development costs for the tactical headsets were \$412,000 and procurement costs were \$60.2 million.

DASN (S) Global War on Noise Initiative

On 8 June 2007, DASN (S) issued a memo outlining a new initiative, known as the Global War on Noise, to bring attention to the increasing combat noise-induced hearing loss problem throughout DON. DASN (S) expressed that DON “...continue[s] to design and procure weapon systems that expose our personnel to levels of noise that even with the most advanced personal noise attenuation devices available, far exceed maximum allowable Occupational Safety and Health Administration (OSHA) standards. We can and must do a better job of protecting those men and women who routinely sacrifice so much for this country.” He further stated that “it is obvious that, if we are to resolve our escalating hearing loss problem, increased emphasis must be placed in the design and acquisition of quieter equipment and the use of more effective engineering controls to reduce ambient noise levels.” According to a DASN (S) representative, the intent of the Global War on Noise is to capture existing hearing protection initiatives and increase visibility and awareness in the Navy of the effects of exposure to hazardous noise.

NRAC

In December 2008, ASN (RD&A) requested NRAC¹⁰ to conduct a study on Tactical Jet Engine Noise Reduction. The objective of the study was to investigate the current technology for reducing tactical jet engine noise and to make recommendations for actions to both reduce jet engine noise in existing engines and to achieve lower noise levels in the next generation of tactical jet aircraft. The NRAC Report on Jet Engine Noise Reduction, dated 24 April 2009, made several recommendations, including: (1) find a senior DoD champion/advocate for jet aircraft noise reduction; (2) initiate a long-term research program to obtain the needed understanding of the physics of jet noise; (3) conduct a competitive design among the airframe prime contractors to start identifying the design space for noise reduction in tactical aircraft; (4) support the hearing protection roadmap and fund the procurement of needed improved hearing protection; (5) expand distribution of improved hearing protection beyond aviation personnel; and (6) expand and diversify Navy medical research into physiological effects of noise.

¹⁰ NRAC is an independent civilian scientific advisory group dedicated to providing objective analyses in the areas of science, research, and development. The Committee reports to the Secretary of the Navy through ASN (RD&A).

Need for a Corporate Approach

While a great deal of effort has been made and is ongoing and planned, and millions of dollars have been/will be invested, DON does not have a corporate approach to hazardous noise mitigation. Formal coordination and collaboration of efforts to mitigate exposure to hazardous noise did not occur because there was no overall corporate management of hazardous noise and noise-induced hearing loss. In our opinion, there should be a central body (Program Management Office, Center of Excellence, etc.) to manage efforts to mitigate hazardous noise to ensure that appropriate actions are being taken to address the issue. The central body could take a variety of forms, but should have the necessary staffing, authority, and organizational placement to be a strong and effective advocate to DON's most senior military and political leadership for hazardous noise mitigation in DON. Responsibilities for the central body could include research and development of noise reduction solutions and hearing protection, coordination of efforts among DON organizations, and implementation and enforcement of necessary guidance. The central body should be a "champion" for noise at a high enough level to have the authority to be effective in causing and influencing action to be taken, and be sufficiently staffed with stakeholder participation, to include representatives from the Systems Commands, Fleet, acquisition program offices, safety community, medical community, and ONR. The central body should be in a position to influence DON policies and procedures for safety, acquisition, and requirements development. The central body should do such things as:

- Provide input to guide policy development on the hazardous noise issue for DON (Navy and Marine Corps);
- Implement and enforce clear Secretary of the Navy (SECNAV)-level departmental guidance/standards on acceptable/unacceptable noise levels to ensure maximum effort is devoted to noise mitigation;
- Involve safety and medical offices in the risk assessment and milestone decision process to raise visibility and importance at decision points;
- Serve as an advocate for funding for efforts related to noise, and coordinate/oversee the research and development of noise reduction solutions and hearing protection;
- Serve as the advocate for reviewing existing ideas and technologies being developed for new programs and, if possible, apply technologies on existing platforms that emit hazardous noise;
- Leverage new ideas and technology across DON;
- Be the collector and repository for information available commercially and within the Government regarding new technologies and best industry practices for reducing noise;

- Coordinate efforts, particularly those with common applications, among DON organizations; and
- Coordinate with the Hearing Conservation Program¹¹ to help design performance metrics to identify hazardous noise areas, identify personnel being exposed to hazardous noise, baseline and track the hearing levels of exposed personnel over time to detect and take action, where appropriate, to address trends in hearing loss, and use the data to assess where to target resources to areas causing the greatest hearing loss.

Several stakeholders, including ONR, AIR 4.4, and NRAC, agreed that there needs to be a “champion” for the noise issue. Examples where DON/DoD has established a central body to address an issue through collaboration are the Joint Guam Program Office and DoD Ergonomics Working Group:

The Joint Guam Program Office was established on 25 August 2006, to facilitate, manage, and execute requirements associated with the rebasing of Marine Corps assets from Okinawa to Guam, and to implement the Defense Base Realignment and Closure decision to establish a Joint Base on Guam. The Joint Guam Program Office reports directly to ASN (I&E), and leads the coordinated planning efforts among the DoD Components, DON organizations, and other stakeholders to consolidate, optimize, and integrate the existing DoD infrastructure capabilities on Guam. The Joint Guam Program Office is responsible for coordinating all aspects of the Guam military build-up program, which requires coordination with other DoD and DON organizations, foreign governments, other Federal agencies, and the host territorial Government.

The DoD Ergonomics Working Group serves as the technical advisor to the DoD Components through the DoD Safety and Occupational Health Committee, and partners with other Government agencies regarding the safety and health aspects of work-related musculoskeletal disorders. The DoD Ergonomics Working Group identifies significant policy and program execution issues, prepares DoD draft positions, and cross-feeds information across all DoD Components on the technical aspects of ergonomics and DoD resources available for the anticipation, recognition, evaluation, and control of hazards associated with work-related musculoskeletal disorders. The DoD Ergonomics Working Group forms subgroups as needed to address specific issues and reports back to the working group.

¹¹ According to OPNAVINST 5100.23G, dated 30 December 2005, the goal of the Hearing Conservation Program is to prevent occupational hearing loss and assure auditory fitness for duty of all Navy personnel. It includes noise measure and analysis, engineering control, hearing protective devices, audiometry, and education. All Navy personnel, military and civilian, except those specifically excluded in the Instruction, who are required to work in designated hazardous noise areas or with equipment which produces or is reasonably expected to produce exposure levels at or above a hazardous level, shall be entered into a Hearing Conservation Program (the Hearing Conservation Program is managed at the activity level, and is not tied to the mitigation of hazardous noise in the acquisition of programs and equipment).

DON organizations have been informally collaborating and coordinating research and development efforts to mitigate exposure to hazardous noise. However, because the collaboration is informal and ad hoc, and not led by a corporately defined philosophy and approach, successes may not be sufficiently leveraged to mitigate similar hazardous noise related risks/issues among DON organizations. As noted, several different and separately managed hearing protection efforts are currently ongoing in DON. Instead of beginning development of a new hearing protection effort, an organization may be able to use or modify the hearing protection that was developed by another organization to fit their needs. A NAVSEA representative stated that the LCS custom molded earplugs could be leveraged by other programs, such as EFV. While we cannot confirm that the LCS earplug would be a viable solution for EFV or another acquisition program, in our opinion, it would be beneficial for all Systems Commands to investigate the possibility of leveraging current and ongoing noise reduction and hearing protection successes from other Systems Commands in an effort to reduce noise-induced hearing loss. In addition, there could be a duplication of efforts if DON organizations are unaware of completed, ongoing, and planned efforts of other DON organizations. Further, duplication of efforts could unnecessarily extend the identification/realization of viable solutions to mitigate exposure of Sailors and Marines to hazardous noise.

As discussed previously, much effort was begun in recent years to address the noise issue. This occurred because of top-level emphasis by DON's most senior leaders in the Secretariat, Navy, and Marine Corps. As such, in our opinion, the successes achieved were to a great extent due to the efforts of individuals currently serving in those positions. To better ensure DON has the capacity to sustain far into the future the emphasis and focus on mitigating debilitating hearing loss, there needs to be an overarching philosophy and a structured control environment put in place.

Recommendations and Corrective Actions

Our recommendations for Finding 1, summaries of management responses, and our comments on the responses are presented below. The complete texts of the responses are in the Appendixes.

We recommend that ASN (RD&A):

Recommendation 1. Coordinate with the Chief of Naval Operations (CNO) (Deputy Chief of Naval Operations (DCNO) for Fleet Readiness and Logistics (N4); DCNO (Integration of Capabilities & Resources) (N8); Commander, Fleet Forces Command; OPNAV Safety Liaison Office (N09FB)); Commandant of the Marine Corps; and ASN (I&E) to establish a central DON body, with responsibility and authority for the actions discussed in the finding, to manage efforts to mitigate exposure to hazardous noise throughout DON organizations.

Office of ASN (RD&A) (OASN (RD&A) response to Recommendation 1.

Concur. OASN (RD&A) agrees formation and continued active engagement of a central DON body to manage hazardous noise risks is appropriate. Upon completion of the Naval Audit Service final report on this subject and subsequent agreement of DON comments, OASN (RD&A) will pursue development of such central DON group. Target completion date is 30 December 2010. A status update will be provided within 6 months of issuance of the final report. This status update will include a consolidated DON response addressing progress establishing the recommended central DON group.

Naval Audit Service comment on OASN (RD&A) response to Recommendation 1. The management response and planned actions meet the intent of the recommendation.

We recommend that CNO:

Recommendation 2. Establish a plan of action and milestones to identify the earliest and most feasible opportunity, upon Sailors' entry into service, to fit and issue the appropriate and most effective form of hearing protection to Sailors in Navy Enlisted Classifications known to be exposed to hazardous noise.

Recommendation 3. Establish a plan of action and milestones to fit and issue the appropriate and most effective form of hearing protection to all Sailors already in Navy Enlisted Classifications, known to be exposed to hazardous noise.

OPNAV did not respond to Recommendations 2 and 3.

Naval Audit Service comment on Recommendations 2 and 3. OPNAV did not provide an official response to Recommendations 2 and 3. Therefore, we consider these recommendations to be undecided, and are resubmitting them to CNO for response.

We recommend that the Commandant of the Marine Corps:

Recommendation 4. Establish a plan of action and milestones to identify the earliest and most feasible opportunity, upon Marines' entry into service, to fit and issue the appropriate and most effective form of hearing protection to Marines in Military Occupational Specialties known to be exposed to hazardous noise.

Marine Corps response to Recommendation 4. Concur. A plan of action and milestones to identify the earliest and most feasible opportunity, upon Marines' entry into service, to fit and issue the appropriate and most effective form of hearing protection to Marines in Military Occupational Specialties known to be exposed to hazardous noise, will be included in the update/revision to the current

Marine Corps Order 6260.1E, "MARINE CORPS HEARING CONSERVATION PROGRAM." The plan of action and milestones shall focus on implementation of hearing readiness at entry level training for officers and enlisted along with material solutions. This revision is dependent on the ASN (RD&A) guidance to establish a central DON body, with responsibility and authority to manage efforts to mitigate exposure to hazardous noise throughout DON organizations. Target completion date is 30 December 2010. An interim update will be provided on 4 July 2010.

Naval Audit Service comment on Marine Corps response to

Recommendation 4. The management response and planned actions meet the intent of the recommendation. However, it should be noted that the Marine Corps' planned actions and target completion date of 30 December 2010 are separate and independent from the recommendation to ASN (RD&A) to establish a central DON body for hazardous noise.

Recommendation 5. Establish a plan of action and milestones to fit and issue the appropriate and most effective form of hearing protection as part of the uniform to all Marines already in Military Occupational Specialties known to be exposed to hazardous noise.

Marine Corps response to Recommendation 5. Concur. A plan of action and milestones to fit and issue the appropriate and most effective form of hearing protection as part of the uniform to all Marines already in Military Occupational Specialties known to be exposed to hazardous noise will be included in the update/revision to the current Marine Corps Order 6260.1E, "MARINE CORPS HEARING CONSERVATION PROGRAM." Plan of action and milestones will include the use of education and leadership's focus on knowledge and value of hearing readiness upon entry into the Marine Corps and enforcement throughout one's service, as well as technology improvements. This revision is dependent on the ASN (RD&A) guidance to establish a central DON body, with responsibility and authority to manage efforts to mitigate exposure to hazardous noise throughout DON organizations. Target completion date is 30 December 2010. An interim update will be provided on 4 July 2010.

Naval Audit Service comment on Marine Corps response to

Recommendation 5. The management response and planned actions meet the intent of the recommendation. However, it should be noted that the Marine Corps' planned actions and target completion date of 30 December 2010 are separate and independent from the recommendation to ASN (RD&A) to establish a central DON body for hazardous noise.

Finding 2: Acquisition Program Office Noise Mitigation Process

Synopsis

Our audits of four DON acquisition programs (CVN 78, EFV, F/A-18E/F and EA-18G, and JSF), showed that the responsible program offices could have better managed their programs to mitigate hazardous noise, in compliance with MIL-STD 882D. Specifically, we found that:

- One program office did not officially identify some known noise hazards, and in one case did not attempt to mitigate a noise hazard at all;
- Two program offices did not follow the system safety design order of precedence (i.e., the program offices did not make a sufficient effort early in the acquisition process to design less noisy systems), and had to rely on hearing protection devices external to the system to mitigate the noise hazard;
- Three of the four acquisition programs did not include specific thresholds/goals in Operational Requirements Documents (ORDs)¹² or contracts for known noise hazards;
- All four program offices used nonstandard risk matrices and categories preventing comparison of risk across DON acquisition programs;
- Three program offices assigned risk acceptance authority levels that were too low and not commensurate with DON guidance, and one program office did not establish all risk acceptance authority levels;
- Two program offices did not have an appropriate process for assigning Risk Assessment Codes (RACs) to noise hazards;
- One program office assigned a RAC that was too low compared to the RAC assigned by similar programs with virtually the same, or very similar hazards; and
- Three program offices did not sufficiently track noise hazards and residual mishap risk.

These opportunities for improvement occurred due to the need for more fully developed and more definitive policies and procedures, better designed and more effective internal management controls, and more proactive oversight from DON leadership. As a result,

¹² The ORD is an expression of thresholds and objectives in the form of measure of effectiveness or performance, and minimum acceptable requirements for the proposed concept or system. The ORD is prepared by the user or the user's representative and describes the overall mission area, the type of system proposed, and the anticipated operational and support concepts in sufficient detail for program and logistics support planning and includes a brief summary of the mission need. The use of "ORD" in this report refers to the major requirements documents, including the Initial Capabilities Document for Milestone A, Capability Development Document for Milestone B, and Capability Production Documents for Milestone C now required by the Joint Capabilities Integration and Development System (JCIDS) process, as well as previously developed ORDs for Milestones B and C.

noise hazards may not have been fully assessed to determine appropriate and potential mitigation solutions. There also may not have been an appropriate level of visibility and awareness of the risk at higher command levels. Basing program decisions on incomplete information could lead to insufficient mitigation of noise and other hazards, contributing to a hazardous environment for Sailors and Marines. According to the Naval Safety Center, continuous exposure to hazardous noise reportedly ensures permanent hearing loss to Sailors and Marines. In addition to the personal cost to Sailors and Marines, the economic consequences of hearing impairment to DON include lost time and decreased productivity; loss of workers through medical disqualification; military disability settlements; retraining; and expenses related to medical treatment.

Background

The Naval Sea Systems Command (NAVSEA) Shipboard Habitability Design Criteria Manual,¹³ dated 1 December 1995, states that airborne noise levels for Navy ships and submarines are expressed as acceptable compartment noise levels and are categorized according to personnel functional requirements. For example, engine and auxiliary machinery rooms are assigned a Category D designation, which has a limit of 84 dB, while berthing and living spaces are assigned a Category B designation, which has a limit of 70 dB. The manual also states that the compartment categories and acceptable noise levels apply to steady-state noise and not to impact or impulse noise, for which the standard is 140 dB.

According to the Naval Safety Center, noisy areas on aircraft carriers include the flight deck, gallery deck (located directly below the flight deck), and other workspaces, such as engine and machinery rooms (see Figure 1). Sources of airborne noise on the gallery deck include jet noise, as well as catapult, jet blast deflector, and arresting gear equipment. According to the Naval Safety Center, airborne noise levels on the gallery deck, where Sailors live and work, can exceed 100 dB. In addition, ventilation systems, auxiliary equipment, and the ship's propeller also contribute to airborne noise.

Figure 1: Aircraft Carrier Decks



Source: <http://www.navy.com>

¹³ The NAVSEA Shipboard Habitability Design Criteria Manual is directed for use by OPNAVINST 9640.1A, "Shipboard Habitability Program," dated 3 September 1996, for developing new ship construction specifications.

According to a Naval Air Warfare Center Technical Report, “U.S. Navy Flight Deck Hearing Protection Use Trends: Survey Results,” dated 18 May 2006, military aircraft, such as the F/A-18 and JSF, produce about 148-152 dB of steady-state noise. The report stated that aircraft carrier flight deck personnel work in close proximity to high-level aircraft engine noise for extended periods of time. It further reported that a typical busy day for flight deck personnel is approximately 60 aircraft launches and recoveries, and that flight deck personnel are exposed to 20-30 seconds of maximum power aircraft noise during each aircraft launch, and 3 seconds during recovery.

Audit Results

In our series of audit reports, we determined that the acquisition program offices could have better managed their programs to mitigate hazardous noise. Our audits found the following related to the System Safety process (not every command had a problem in every area): lack of official identification of hazards, noncompliance with the system safety design order of precedence, use of nonstandard risk categories (matrix), noncompliant risk acceptance authority levels, improper assignment of RACs, and insufficient tracking of hazards and residual mishap risk. This occurred because of the need for stronger policies, procedures, and internal management controls, and the need for more proactive oversight by DON leadership. Additionally, three of the four acquisition programs did not include specific thresholds/goals in ORDs or contracts for known noise hazards, so the development contractor was not accountable for reducing hazardous noise. An overview of these issues is presented on the following pages. For details, please refer to Naval Audit Service reports N2009-0002, 16 October 2008 (EFV); N2009-0008, 31 October 2008 (F/A-18E/F Super Hornet and EA-18G Growler); N2009-0013, 15 December 2008 (JSF); and N2009-0022, 19 March 2009 (CVN 78).

Official Identification of Hazards

The EFV Program Office, PMA 265, and the JSF Program Office (JPO) officially identified known noise hazards that were recognized by the Naval Safety Center, in accordance with MIL-STD 882D, Sections 3.2.3 and 4.2 (see Exhibit C). However, while the CVN 78 Program Office (PMS 378) did officially identify hazardous noise in the engine rooms and auxiliary rooms, they did not officially identify the known flight deck and gallery deck noise hazards associated with the CVN 78 Aircraft Carrier. According to the Naval Safety Center, noise levels on the flight deck and gallery deck are known hazards on an aircraft carrier. Even though PMS 378 did not officially identify gallery deck noise as a hazard, they

Figure 2: Results

RESULTS AT A GLANCE	
PMS 378 - CVN 78	✗
EFV Program Office - EFV	✓
PMA 265 - F/A-18E/F and EA-18G	✓
JPO - JSF	✓
Key: ✓ = Compliance; ✗ = Non-compliance	

did take steps to mitigate this noise hazard. However, PMS 378 neither officially identified nor took steps to mitigate the flight deck noise hazard. PMS 378 representatives stated that they did not consider hazardous noise on the flight deck because it was not included in their ORD. We verified that requirements to mitigate flight deck noise were not identified in the ORD. However, MIL-STD 882D requires a program to consider hazards that could occur over the system life cycle. The Standard does not state that a requirement to mitigate specific hazards should be specified in the ORD in order for this to occur.

This occurred, in part, due to a lack of controls and oversight at a higher level to ensure that DON acquisition program offices officially identified all known hazards as part of their system safety process. As a result of not officially identifying some hazards that could occur over the life of the system, those hazards were not properly assessed to determine appropriate and potential mitigation solutions. In addition, mitigation solutions may not have been realized at the most cost effective stages of the acquisition process. As a result of not officially identifying those hazards, they were not assigned RACs. RACs directly impact the visibility of the risk and its potential consequences, and determine how high in the chain of command the authority to accept the risk is vested. Those hazards were also not tracked, which may limit management's ability to efficiently reference past efforts, associated levels of hazard severity and probability, and current initiatives, as well as develop future goals and milestones (see Recommendation 6).

System Safety Design Order of Precedence

While two of the four program offices reviewed (PMS 378 (CVN 78) and EFV Program Office (EFV)) followed the System Safety Design Order of Precedence for mitigating noise hazards, the remaining two program offices (PMA 265 (F/A-18E/F and EA-18G) and JPO (JSF)) did not.

MIL-STD 882D, Section 4.4 requires that identified hazards be eliminated through design selection first, and then, if unable to do that, incorporate safety devices, provide warning devices, and/or develop procedures and training, in that order.

PMA 265 did not initially attempt to mitigate the flight deck noise hazard¹⁴ through design selection for the F/A-18E/F and EA-18G aircrafts. JPO was unable to provide any evidence showing that the program office first attempted to mitigate the flight deck noise hazard¹⁵ through design selection before deciding to mitigate the hazard through the use of safety devices. As a result, hazardous noise may not be mitigated to its lowest level and could result in exposure to high levels

Figure 3: Results

RESULTS AT A GLANCE	
PMS 378 - CVN 78	✓
EFV Program Office - EFV	✓
PMA 265 - F/A-18E/F and EA-18G	✗
JPO - JSF	✗
Key: ✓ = Compliance; ✗ = Non-compliance	

¹⁴ PMA 265 referred to hazardous noise on the flight deck as the "flight-line/deck jet noise hazard."

¹⁵ JPO referred to hazardous noise on the flight deck as the "maintainer noise hazard."



of noise for Sailors and Marines. In addition, decisionmakers may not know whether design solutions to mitigate the noise hazard could have been developed and incorporated into the design. They also may not have the opportunity to weigh the potential benefits of noise mitigation solutions versus the associated costs, or against the tradeoffs in aircraft performance, as the design selection was not originally sought to mitigate the noise hazards.

These weaknesses occurred in part because there was a lack of controls and oversight from DON leadership to ensure the program offices followed the System Safety Design Order of Precedence. Additionally, some program office representatives stated that they did not mitigate hazardous noise because there were no specific noise thresholds/goals mentioned in the ORDs and therefore not included in the contracts. As noted, MIL-STD 882D does not state that a requirement to mitigate specific hazards must be specified in the ORD in order for this to occur. However, in our opinion, defining parameters, as well as acceptable and unacceptable levels of hazardous noise, for the program office to execute, and for which to hold the contractor accountable, would ensure efforts are being made to identify ways to reduce hazardous noise through system design (see Recommendations 7, 8, and 15).

Risk Categories and Risk Acceptance Authority Levels

The four program offices reviewed did not establish risk categories¹⁷ or risk acceptance authority levels (see Exhibit G) in compliance with DoD Instruction 5000.2¹⁸ or SECNAV Instruction (SECNAVINST) 5000.2C (which was effective throughout most of the audit but was replaced by SECNAVINST 5000.2D in October 2008). DoD Instruction 5000.2, Section E.7.1.6 states that the Component Acquisition Executive (CAE) (ASN (RD&A)) is the risk acceptance authority for “High” risks, the PEO-level is the authority for “Serious” risks, and the Program Manager (PM) is the authority for “Medium” and “Low” risks. SECNAVINST 5000.2C, Enclosure 7, Section 7.3 includes the risk categories and risk acceptance authority levels shown in Table 3 of Exhibit C. Program offices used their own individual, inconsistent criteria, definitions, and approaches to assess risks for noise

Figure 4: Results

RESULTS AT A GLANCE	
PMS 378 - CVN 78	X
EFV Program Office - EFV ¹⁶	X
PMA 265 - F/A-18E/F and EA-18G	X
JPO - JSF	X
Key:  Compliance;  Non-compliance	

¹⁶ In Naval Audit Service report N2009-0002, we regarded the EFV Program Office as being in compliance with SECNAVINST 5000.2C because they established three risk categories that were more stringent than the categories specified in SECNAVINST 5000.2C. We are showing them as “noncompliant” in this report because, while more stringent, the categories differed from the SECNAV requirement.

¹⁷ We did not assess PMS 378's risk categories because the program was initiated before 19 November 2004, when the SECNAVINST 5000.C guidance became effective. However, we did assess their risk acceptance authority levels.

¹⁸ DoD Instruction 5000.2 was canceled on 8 December 2008 with the issuance of DoD Instruction 5000.02, which includes the same risk acceptance authority levels (in Enclosure 12, Section 6) as DoD Instruction 5000.2.

hazards, rather than a corporate approach. In our opinion, a corporate approach would provide for common criteria, definitions, and presentation methodologies that would allow senior leaders to view risks corporately across acquisition programs. In addition, PMS 378 did not establish risk acceptance authority levels in accordance with MIL-STD 882D, Section 4.1, which requires a program to define how hazards and residual mishap risks are communicated to, and accepted by, the appropriate risk acceptance authority. Risk categories are a combination of severity¹⁹ and probability²⁰ levels and have corresponding risk acceptance authority levels.

This occurred, in part, because DoD and DON guidance related to establishing risk categories was inconsistent. SECNAVINST 5000.2C states that risk levels are defined in Table E7T2 (derived from MIL-STD 882D) and by MIL-STD 882D. Table E7T2 (see risk matrix in Table 3 of Exhibit C) contains the required Risk Assessment Matrix to be used for analyzing and identifying Environmental, Safety, and Occupational Health (ESOH) risk levels, and outlines a 4x5 matrix approach. The reference to MIL-STD 882D in SECNAVINST 5000.2C was not clear and could have been interpreted by program offices as an option to follow the matrix in MIL-STD 882D. MIL-STD 882D provides suggested severity and probability levels, as well as examples of a risk matrix and risk categories. The risk categories are included in the Appendix section of the Standard, which is not mandatory and therefore can be tailored by acquisition program offices. Specifically, Appendix A states the following:

[This appendix] includes further explanation of the effort and activities available to meet the requirements described in section 4 of the standard. This appendix is not a mandatory part of the standard and is not to be included in solicitations by reference. However, PMs may extract portions of this appendix for inclusion in requirement documents and solicitations.

The four program offices reviewed did not establish risk acceptance authority levels that complied with DoD Instruction 5000.2 and SECNAVINST 5000.2C (which has since been replaced by SECNAVINST 5000.2D), in part, because there was a lack of internal management controls and oversight to ensure program offices were following the required guidance. The risk acceptance authority levels included in DoD Instruction 5000.2 do not go below the PM level. In addition, SECNAVINST 5000.2C explicitly stated that the risk acceptance authority may not be delegated below the PM.

During our audit, SECNAVINST 5000.2C was canceled with the issue of SECNAVINST 5000.2D on 16 October 2008. SECNAVINST 5000.2D, Chapter 7, Section 7.3 no longer includes a risk matrix and now refers to MIL-STD 882D for risk definitions, which again is not mandatory and therefore can be tailored.

¹⁹ An assessment of the consequences of the most reasonable, credible mishap that could be caused by a specific hazard.

²⁰ The aggregate probability of occurrence of the individual events/hazards that might create a specific mishap.

SECNAVINST 5000.2D retains the risk acceptance authority levels from the previous version of the guidance (see risk acceptance authority levels in Table 3 of Exhibit C); however, the guidance no longer states that the risk acceptance authority may not be delegated below the PM. JPO created a “Very Low” risk level that could be accepted below the PM level (at the System Safety Working Group). Without the language that states that risks cannot be delegated below the PM, program offices could assign risk acceptance authority below the PM for risks they deem to be lower than “Low.”

Establishing risk categories that were not compliant with guidance, increased the potential that hazards and residual risks could be assessed in a manner that is inconsistent with other like programs. In our opinion, standardization and consistency across programs are essential to corporate-level evaluations of program risks. Lack of standardization could limit DON leadership’s ability to properly evaluate similar ESOH risks across like programs. Each of the four programs reviewed for this audit utilized different risk assessment matrices to assess the risk of hazardous noise. Specifically, similar program offices, such as PMA 265 and the JPO, used different matrices to categorize a similar flight deck noise hazard (see Exhibit G). Accordingly, to have a common understanding of the risks of hazardous noise across the four programs, DON leaders would need to understand the nuances of each of the different matrices and the different terminology. Additionally, as a result of establishing risk acceptance authority levels that do not comply with guidance, a hazard and its residual mishap risk may not be visible to DON leadership and may not be accepted at the appropriate risk acceptance authority level. This could limit DON leadership’s ability to properly evaluate ESOH risks and make effective risk management decisions (see Recommendations 9 and 10).

Assignment of Risk Assessment Codes

While two of the four program offices reviewed (PMS 378 and PMA 265) had an appropriate process for assigning RACs²¹ to noise hazards, the remaining two program offices (the EFV Program Office and JPO) did not. PMS 378 maintained an appropriate process for reducing the RAC assigned to hazardous noise in the engine rooms and auxiliary rooms based on noise mitigation efforts. In addition, PMA 265 formally assigned a RAC for the flight deck noise hazard and appropriately maintained the associated RAC, as no mitigation efforts were taken. Conversely, the EFV Program Office reduced the steady-state noise hazard RAC based on testing limitations imposed by the program office rather than on the life expectancy of the system as advised by MIL-STD 882D,

Figure 5: Results

RESULTS AT A GLANCE	
PMS 378 - CVN 78	✓
EFV Program Office - EFV	✗
PMA 265 - F/A-18E/F and EA-18G	✓
JPO - JSF	✗
Key: ✓ = Compliance; ✗ = Non-compliance	

²¹ A RAC is a specific rating within a program office’s risk matrix/categories that is assigned to the mishap risk associated with the identified hazard according to the level of severity and probability of that particular risk.

Section A.4.4.3.2.2. JPO reduced the flight deck noise hazard RAC based on a mitigation approach, which included a planned rotation of flight deck positions, that was not coordinated with, or agreed to by, the ultimate end user (using organization) as advised by MIL-STD 882D, Sections A.4.4.5 and A.4.4.8.1.2. A process for appropriately assigning RACs to manage risk is critical because it directly impacts the visibility of the risk and its potential consequences, and determines how high in the chain of command the authority to accept the risk is vested. In addition, similar programs with similar hazards assigned RACs differently, which is of significant concern. Specifically, PMA 265 initially assigned and maintained a RAC level of “Serious” to the F/A-18E/F and EA-18G flight deck noise hazard, which is a higher rating than JPO’s initial RAC level of “Medium” and JPO’s reduced rating level of “Very Low” for the JSF.

This occurred, in part, because guidance on evaluating and categorizing hazards and their residual risks was not clear. While MIL-STD 882D, Section 4.3 directs a program to assess the severity and probability of the mishap risk associated with each identified hazard, it does not specifically indicate how to assign or reduce RACs. Assignment of RACs is discussed in MIL-STD 882D, Appendix A, Sections A.4.4.3.2.2, A.4.4.5, and A.4.4.8.1.2; however, the appendix is not mandatory, as noted above. Therefore, while it would be a good business practice to follow the appendix section of the guidance, program offices are not required to do so. In our opinion, due to the severity of the escalating hearing loss problem, ASN (RD&A) should issue policy that requires DON acquisition programs to assign an initial RAC (prior to considering mitigation solutions) with acceptance authority at the Component Acquisition Executive level for all noise hazards that expose Sailors and Marines to hazardous levels of noise (> 84 dB).

As a result, there may not be an appropriate level of visibility and awareness of the risk at higher command and management levels. Specifically, it could allow acceptance of the hazard and its residual mishap risk at the PM level or below, rather than a higher level of the chain of command. In addition, similar programs with similar hazards may be assigning RACs differently, as in the case of PMA 265 and JPO. This difference could limit DON leadership’s ability to properly evaluate similar ESOH risks across like programs (see Recommendations 11-13).

Tracking of Hazards and Residual Mishap Risk

While one of the four program offices reviewed (EFV Program Office) sufficiently tracked noise hazards, the three remaining program offices (PMS 378, PMA 265, and JPO) did not. The EFV Program Office maintained the most comprehensive hazard database for tracking hazards of the four program offices reviewed and, as a result of the audit, they intended to further improve their hazard tracking process. The remaining three program offices did not sufficiently track noise hazards, their closure actions, and the residual mishap risk, and did not maintain a tracking system that included this information, as required by MIL-STD 882D, Sections 4.8 and A.4.4.8.1. While PMS 378 and JPO did not sufficiently track noise hazards and residual mishap risk, PMA 265 did not track occupational health hazards and residual mishap risk, including the flight deck noise hazard, at all.

Figure 6: Results

RESULTS AT A GLANCE	
PMS 378 - CVN 78	✗
EFV Program Office - EFV	✓
PMA 265 - F/A-18E/F and EA-18G	✗
JPO - JSF	✗
Key: ✓ = Compliance; ✗ = Non-compliance	

This occurred, in part, because the guidance included in MIL-STD 882D, Sections 4.8 and A.4.4.8.1, was not clear. While MIL-STD 882D directs a program to track hazards, closure actions, and residual mishap risk, it does not specifically indicate the information that should be tracked. For example, MIL-STD 882D does not specify that a program office should track for each hazard: the hazard description, initial and current RAC, mitigation selection, and chronology of actions taken. Section A.4.4.8.1 of the Standard more clearly explains the process for the tracking of hazards and residual mishap risk. However, this section is included in the appendix of the Standard, which is not mandatory, as noted above. Therefore, while it would be a good business practice to follow the appendix section of the guidance, program offices are not required to do so.

As a result, a concise, dated record of mitigation efforts and their associated effectiveness on reducing residual mishap risk is not readily available for program management review. Without sufficient details of actions taken to mitigate the identified hazards, management's ability to efficiently reference past efforts, associated levels of hazard severity and probability, and current initiatives, as well as develop future goals and milestones, may be limited. In turn, this may limit DON leadership's decisionmaking ability as it relates to a program's hazard mitigation. Basing program decisions on incomplete and inaccurate information could lead to insufficient mitigation of noise and other hazards, contributing to a hazardous environment to Sailors and Marines (see Recommendation 14).

Overall Effect

The conditions we found may contribute to a hazardous environment of high noise exposure that, according to the Naval Safety Center, ensures permanent hearing loss to Sailors and Marines. The Safety Center added that, in addition to the personal cost to Sailors and Marines, the economic consequences of hearing impairments to DON include: lost time and decreased productivity; loss of workers through medical disqualification; military disability settlements; retraining; and expenses related to medical treatment.

Recommendations and Corrective Actions

Our recommendations for Finding 2, summaries of management responses, and our comments on the responses are presented below. The complete texts of the responses are in the Appendixes.

We recommend that ASN (RD&A):

Recommendation 6. Establish internal management controls and provide oversight to verify that all acquisition programs in their purview officially identify and assess known/recognized noise hazards early in the acquisition process.

OASN (RD&A) response to Recommendation 6. Concur. The current draft SECNAVINST 5000.2E requires PMs to manage ESOH risks for their systems' life cycle using the methodologies described in the DoD Standard Practice for System Safety (MIL-STD 882D). These areas are program-dependent and include, but are not limited to, noise, vibration, human factors, etc. This update also requires PMs to include in the Acquisition Strategy, a summary of the Programmatic ESOH Evaluation (PESHE) including ESOH hazards and associated risks, proposed mitigation plans, and a strategy for integrating ESOH considerations, including technology, into the systems engineering process. Considering the unpredictable nature of staffing such a complex policy document, OASN (RD&A) would estimate at least an interim release of SECNAVINST 5000.2E by 30 September 2010. Should this estimate not bear out, OASN (RD&A) would pursue issuing a policy memo indicating the required use of MIL-STD 882D as discussed above.

As an internal control process, per Systems Engineering Technical Review (SETR) policy promulgated 19 January 2010, Technical Review Boards (TRBs) will be conducted for each SETR. The SYSCOM Chief Systems Engineer (CHSENG) will assign, in writing, a senior Government employee, independent of the program, to chair the TRB. Selection of the chair is typically from the

technical authority chain and is a senior individual with technical expertise relevant to the program. In addition, the Six-Gate review process has been significantly expanded in requirements necessary to complete each review. One such requirement is that the PM address program risk during the pre-Milestone A review. The program manager is also required to include the results of the SETR event and technical risk assessment pertaining to that Gate Review.

Naval Audit Service comment on OASN (RD&A) response to Recommendation 6. The management response and planned actions meet the intent of the recommendation.

Recommendation 7. Establish internal management controls and provide oversight to ensure that DON acquisition programs include the threshold/goal requirements (noted in Recommendation 15) in their respective contracts within the Materiel Solution Analysis, Technology Development, and Engineering and Manufacturing Development phases.

OASN (RD&A) response to Recommendation 7. Concur. OASN (RD&A) acknowledges internal management controls are necessary to ensure compliance with updated guidance relative to hazardous noise exposure. This is particularly so when ensuring our programs comply with this guidance across the life cycle of a program. Improvements to the Six-Gate review process are underway and include significantly expanded entrance and exit criteria for reviews across the Materiel Solution Analysis, Technology Development, Engineering and Manufacturing Development, and Sustainment life cycle phases. The Systems Design Specification (SDS) plays an important role in these process improvements. The SDS is the end result of flowing down the Capabilities Development Document (CDD) performance requirements into a document that specifies the functional requirements and major programmatic actions required to deliver the system. ESOH requirements are captured in the SDS.

The improved Six-Gate process, which has been expanded to strengthen the posture of the Systems Engineering Process and the associated technical and safety risks as assessed by the independent technical authority, is pending formal release in SECNAVINST 5000.2E. For the next update of the Six-Gate review process, DASN (A&LM), CHSENG, and DASN (S) will coordinate to incorporate an increased focus on compliance with guidance for exposure to hazardous noise. OASN (RD&A) will provide the status of this action to the Naval Audit Service within 6 months of issuance of the final report.

Naval Audit Service comment on OASN (RD&A) response to Recommendation 7. The management response and planned actions meet the intent of the recommendation. OASN (RD&A) did not provide a target

completion date for this recommendation. In subsequent communication, OASN (RD&A) stated that they will be able to provide a more accurate target completion date with the 6-month status update, considering responsible activities would have had time to actually define internal control processes, identify any needed changes, and have a plan to issue policy.

Recommendation 8. Establish and implement controls and provide oversight to ensure that the System Safety Design Order of Precedence is followed during the acquisition process to ensure that, where possible, concerns such as hazardous noise are mitigated early in the process through system design.

OASN (RD&A) response to Recommendation 8. Concur. ASN (RD&A) recognizes the increasing importance of engineering noise reduction designs into our systems early in the development process to avoid the various long-term implications. ASN (RD&A) CHSENG and DASN (A&LM) will coordinate with ASN (I&E), DASN (S) to establish such controls and implement oversight to ensure the System Safety Design Order of Precedence is followed during acquisition program life cycle. This coordination will explore ways to link appropriate hazardous noise mitigation policy to internal controls via an updated Six-Gate review process or other existing appropriate internal control processes. OASN (RD&A) will provide the status of this action to the Naval Audit Service within 6 months of issuance of the final report.

Naval Audit Service comment on OASN (RD&A) response to Recommendation 8. The management response and planned actions meet the intent of the recommendation. OASN (RD&A) did not provide a target completion date for this recommendation. In subsequent communication, OASN (RD&A) stated that they will be able to provide a more accurate target completion date with the 6 month status update, considering responsible activities would have had time to actually define internal control processes, identify any needed changes, and have a plan to issue policy.

Recommendation 9. Revise SECNAVINST 5000.2D to: (1) require the use of a single risk matrix with consistent risk categories and associated definitions and terms for all DON acquisition programs, or by like programs, to follow when evaluating risks; (2) establish uniform guidance for setting risk acceptance authority levels; and (3) prohibit delegation of risk acceptance authority below the PM level.

OASN (RD&A) response to Recommendation 9. Concur. DASN (A&LM) will work with DASN (S) to develop guidance requiring the use of a single risk matrix with consistent risk categories and associated definitions and terms for all DON acquisition programs to follow when evaluating risks. This development effort will also establish uniform guidance for setting risk acceptance authority levels

and prohibit delegation of risk acceptance authority below the PM level. OASN (RD&A) will provide the status of this action to the Naval Audit Service within 6 months of issuance of the final report.

Naval Audit Service comment on OASN (RD&A) response to Recommendation 9. The management response and planned actions meet the intent of the recommendation. OASN (RD&A) did not provide a target completion date for this recommendation. In subsequent communication, OASN (RD&A) stated that they will be able to provide a more accurate target completion date with the 6-month status update, considering responsible activities would have had time to actually define internal control processes, identify any needed changes, and have a plan to issue policy.

Recommendation 10. Establish controls and provide oversight early in the acquisition process to ensure that program offices properly establish risk acceptance authority levels in accordance with the revised SECNAVINST 5000.2D.

OASN (RD&A) response to Recommendation 10. Concur. OASN (RD&A) realizes oversight of proper risk acceptance must be improved to increase our focus in this area. DASN (A&LM), DASN (S), OPNAV N4, OPNAV N8, and RDA CHSENG will work together to incorporate verification of risk acceptance (and associated authority) into the next update of SECNAVINST 5000.2, and also explore ways to include this in the next update of the Six-Gate review process. OASN (RD&A) will provide the status of this action to the Naval Audit Service within 6 months of issuance of the final report.

Naval Audit Service comment on OASN (RD&A) response to Recommendation 10. The management response and planned actions meet the intent of the recommendation. OASN (RD&A) did not provide a target completion date for this recommendation. In subsequent communication, OASN (RD&A) stated that they will be able to provide a more accurate target completion date with the 6-month status update, considering responsible activities would have had time to actually define internal control processes, identify any needed changes, and have a plan to issue policy.

Recommendation 11. Promulgate policy to require, or revise existing policy that requires DON acquisition programs to comply with MIL-STD 882D, Appendix A, related to sections that provide guidance to properly assign RACs and establish controls to ensure compliance.

OASN (RD&A) response to Recommendation 11. Concur. SECNAVINST 5000.2D sets policy for compliance with MIL-STD 882D. OASN (RD&A) agrees internal controls must be in place to ensure such compliance. DASN

(A&LM) will coordinate with DASN (S) in defining and/or developing such internal controls and provide implementation recommendations. This effort will include exploring existing internal controls that lend themselves appropriately to oversight of MIL-STD 882D compliance. OASN (RD&A) will provide the status of this action to the Naval Audit Service within 6 months of issuance of the final report.

Naval Audit Service comment on OASN (RD&A) response to

Recommendation 11. The management response and planned actions meet the intent of the recommendation. In their efforts to establish internal controls, OASN RDA should ensure that the revisions to the SECNAVINST include and make mandatory the guidance contained in Appendix A of the MIL-STD-882 related to assigning RACs. OASN (RD&A) did not provide a target completion date for this recommendation. In subsequent communication, OASN (RD&A) stated that they will be able to provide a more accurate target completion date with the 6-month status update, considering responsible activities would have had time to actually define internal control processes, identify any needed changes, and have a plan to issue policy.

Recommendation 12. Promulgate policy to require, or revise existing policy that requires DON acquisition programs to: (1) assign an initial RAC (prior to considering mitigation solutions) at a level with a corresponding risk acceptance authority of Component Acquisition Executive (CAE) for all noise hazards that expose Sailors and Marines to hazardous levels of noise (according to OPNAVINST 5100.23G); and (2) maintain the RAC at that level until the noise hazard is mitigated below the level considered hazardous. If the noise hazard is not mitigated below the level considered hazardous, require the hazard to be formally accepted by both the User Representative and the CAE prior to deployment.

OASN (RD&A) response to Recommendation 12. Concur.

SECNAVINST 5000.2D requires compliance with MIL-STD-882D, designates risk acceptance authorities, and requires the user representative be a part of the risk acceptance process throughout the system life cycle and provide formal concurrence prior to all Serious and High risk acceptance decisions.

OASN (RD&A) recognizes the need for oversight to ensure noise hazards have been mitigated below levels considered hazardous. DASN (A&LM), DASN (S), and RDA CHSENG will coordinate to develop policy indicating the CAE shall be the risk acceptance authority for hazardous noise exposure of Sailors and Marines until such time that the noise exposure is no longer considered hazardous, according to provisions set forth in OPNAVINST 5100.23G. This policy, and an associated update to the Six-Gate review internal control process, will be incorporated in the next update of SECNAVINST 5000. OASN (RD&A) will provide the status of this action to NAVAUDSVC within 6 months of issuance of the final report.

Naval Audit Service comment on OASN (RD&A) response to

Recommendation 12. The management response and planned actions meet the intent of the recommendation. OASN (RD&A) did not provide a target completion date for this recommendation. In subsequent communication, OASN (RD&A) stated that they will be able to provide a more accurate target completion date with the 6-month status update, considering responsible activities would have had time to actually define internal control processes, identify any needed changes, and have a plan to issue policy.

Recommendation 13. Promulgate policy or revise existing policy to require program offices to: (1) develop mitigation solutions in collaboration with end users (using organization); and (2) obtain formal acceptance of mitigation from end-user solutions prior to reducing the RAC levels, especially when it involves changes to an end users' (e.g. Fleet command, etc.) concept of operations.

OASN (RD&A) response to Recommendation 13. Concur. The current update of SECNAVINST 5000.2 requires effective ESOH efforts encompass establishing ESOH responsibilities within an acquisition program's organizational structure; developing strategies to ensure compliance with ESOH regulatory requirements; identifying and tracking the mitigation of ESOH hazards and associated risks; and formally accepting and communicating identified ESOH risks and their associated mitigations, including obtaining formal user representative concurrence on High and Serious risks. The updated Six-Gate review process supplements these requirements such that each Gate review assesses program health, including risks and associated mitigation.

Naval Audit Service comment on OASN (RD&A) response to

Recommendation 13. The management response and planned actions to update the SECNAVINST 5000.2 meet the intent of the recommendation. OASN (RD&A) also did not provide a target completion date for this recommendation. In subsequent communication, OASN (RD&A) stated that they will be able to provide a more accurate target completion date with the 6-month status update, considering responsible activities would have had time to actually define internal control processes, identify any needed changes, and have a plan to issue policy.

Recommendation 14. Establish guidance that specifies the minimum information program offices are required to track, and establish controls to ensure that DON acquisition program offices maintain a current log of identified hazards and an assessment of residual mishap risk.

OASN (RD&A) response to Recommendation 14. Concur. OASN (RD&A) will coordinate with DASN (S) to determine the most effective way to issue such

guidance. Current internal control processes such as Independent Logistics Assessments, Systems Engineering Technical Reviews, and the Gate Review process will be considered as appropriate mechanisms to ensure compliance with guidance to be developed in response to this recommendation. OASN (RD&A) will provide the status of this action to the Naval Audit Service within 6 months of issuance of the final report.

Naval Audit Service comment on OASN (RD&A) response to Recommendation 14. The management response and planned actions meet the intent of the recommendation. OASN (RD&A) did not provide a target completion date for this recommendation. In subsequent communication, OASN (RD&A) stated that they will be able to provide a more accurate target completion date with the 6-month status update, considering responsible activities would have had time to actually define internal control processes, identify any needed changes, and have a plan to issue policy.

We recommend that DCNO (Integration of Capabilities and Resources) (N8) and Commandant of the Marine Corps:

Recommendation 15. Establish a plan of action and milestones to ensure that a noise threshold/goal is established for DON acquisition programs, especially for those with known noise hazards to meet, and include the threshold/goal as a requirement in the program's ORDs.

DCNO N8 response to Recommendation 15. Concur. OPNAV N8 assesses that current guidance and processes allow for better management of exposure to hazardous noise within Navy's capabilities development process. The JCIDS Manual defines the content of CDDs and Capabilities Production Documents (CPDs). Human Systems Integration (HSI) and related safety issues are both specifically identified in the JCIDS Manual as content to be addressed within Section 15 (Other System Attributes) of the CDD and CPD. Providing threshold and objective values for Other System Attributes is permissible, but rarely done.

OPNAVINST 5310.23 for Navy Personnel Human Systems Integration, signed by OPNAV N1, provides specific guidance for addressing HSI and related safety issues within every Navy JCIDS document review. Navy's JCIDS review and approval process allows for Other System Attributes to be elevated to either Key System Attributes (KSAs) or Key Performance Parameters (KPPs) when deemed appropriate by leadership. OPNAV N09F and OPNAV N1 are asked to review and comment during every Navy JCIDS document review.

OPNAV N8 will continue to work with ASN (RD&A) to ensure all organizations are engaged in the Navy's document review and approval process, and that

requirements minimizing noise hazards are better managed via the Navy's capabilities boards and Two-Pass/Six-Gate review process.

Marine Corps response to Recommendation 15. Concur. A plan of action and milestones to ensure that a noise threshold/goal is established for DON acquisition programs, especially for those with known noise hazards to meet, and include the threshold/goal as a requirement in the program's capabilities documents are currently being reviewed. Actions will include continued process improvements; implementation and oversight of HSI to ensure hearing readiness. Future efforts will be dependent on the ASN (RD&A) guidance to establish a central DON body, with responsibility and authority to manage efforts to mitigate exposure to hazardous noise throughout DON organizations. Target completion date is 30 December 2010. An interim update will be provided 4 July 2010.

Naval Audit Service comment on OPNAV N8 and USMC responses to Recommendation 15. In subsequent communication, N8 indicated that they understand the intent of the recommendation, which is to ensure that noise levels are formally considered in the requirements generation process. That would involve establishing threshold and objective values, which seek to reduce noise levels to Navy Occupational Safety & Health (NAVOSH) standards, to be included as KSAs. N8 will work with ASN (RD&A) to ensure that language directing that these be addressed be included in the SECNAV 5000 series of instructions. There may be cases where prior analysis or the known state of engineering indicates that design solutions to noise levels will be infeasible or extremely costly. In those cases, the sponsor generating the requirements document and the reviewing bodies may decide to either relax or not pursue the requirement. This would need to be, however, a formally documented decision, not just an omission from the document.

Also in subsequent communication, the Marine Corps concurred with N8's approach of answering the recommendation with ASN (RD&A) through the SECNAVINST 5000 series.

The response and planned actions in the subsequent communication from N8 and the Marine Corps meet the intent of the recommendation. OASN (RD&A) has agreed that language to establish threshold and objective values which seek to reduce noise levels to NAVOSH standards will be included in the SECNAV 5000.2 update. This corrective action meets the intent of the recommendation for both N8 and CMC because all DON acquisition programs must meet the requirements of the SECNAV 5000 series. The target completion date for this action will be provided in the OASN (RD&A) status update to the Naval Audit Service within 6 months of issuance of the final report.

Section B

Status of Recommendations

Finding ²²	Rec. No.	Page No.	Subject	Status ²³	Action Command	Interim Target Completion Date	Target Completion Date
1	1	20	Coordinate with the Chief of Naval Operations (CNO) (Deputy Chief of Naval Operations (DCNO) for Fleet Readiness and Logistics (N4); DCNO (Integration of Capabilities & Resources) (N8); Commander, Fleet Forces Command; OPNAV Safety Liaison Office (N09FB)); Commandant of the Marine Corps; and ASN (I&E) to establish a central DON body, with responsibility and authority for the actions discussed in the finding, to manage efforts to mitigate exposure to hazardous noise throughout DON organizations.	O	ASN (RD&A)		12/30/10
1	2	21	Establish a plan of action and milestones to identify the earliest and most feasible opportunity, upon Sailors' entry into service, to fit and issue the appropriate and most effective form of hearing protection to Sailors in Navy Enlisted Classifications known to be exposed to hazardous noise.	U	CNO	7/22/10	
1	3	21	Establish a plan of action and milestones to fit and issue the appropriate and most effective form of hearing protection to all Sailors already in Navy Enlisted Classifications, known to be exposed to hazardous noise.	U	CNO	7/22/10	
1	4	21	Establish a plan of action and milestones to identify the earliest and most feasible opportunity, upon Marines' entry into service, to fit and issue the appropriate and most effective form of hearing protection to Marines in Military Occupational Specialties known to be exposed to hazardous noise.	O	CMC	7/4/10	12/30/10
1	5	22	Establish a plan of action and milestones to fit and issue the appropriate and most effective form of hearing protection as part of the uniform to all Marines already in Military Occupational Specialties known to be exposed to hazardous noise.	O	CMC	7/4/10	12/30/10
2	6	32	Establish internal management controls and provide oversight to verify that all acquisition programs in their purview officially identify and assess known/recognized noise hazards early in the acquisition process.	O	ASN (RD&A)		9/30/10

²² / + = Indicates repeat finding

²³ / O = Recommendation is open with agreed-to corrective actions; C = Recommendation is closed with all action completed; U = Recommendation is undecided with resolution efforts in progress

SECTION B: STATUS OF RECOMMENDATIONS

Finding ²²	Rec. No.	Page No.	Subject	Status ²³	Action Command	Interim Target Completion Date	Target Completion Date
2	7	33	Establish internal management controls and provide oversight to ensure that DON acquisition programs include the threshold/goal requirements (noted in Recommendation 15) in their respective contracts within the Materiel Solution Analysis, Technology Development, and Engineering and Manufacturing Development phases.	O	ASN (RD&A)	12/30/10	²⁴
2	8	34	Establish and implement controls and provide oversight to ensure that the System Safety Design Order of Precedence is followed during the acquisition process to ensure that, where possible, concerns such as hazardous noise are mitigated early in the process through system design.	O	ASN (RD&A)	12/30/10	²⁴
2	9	34	Revise SECNAVINST 5000.2D to: (1) require the use of a single risk matrix with consistent risk categories and associated definitions and terms for all DON acquisition programs, or by like programs, to follow when evaluating risks; (2) establish uniform guidance for setting risk acceptance authority levels; and (3) prohibit delegation of risk acceptance authority below the PM level.	O	ASN (RD&A)	12/30/10	²⁴
2	10	35	Establish controls and provide oversight early in the acquisition process to ensure that program offices properly establish risk acceptance authority levels in accordance with the revised SECNAVINST 5000.2D.	O	ASN (RD&A)	12/30/10	²⁴
2	11	35	Promulgate policy to require, or revise existing policy that requires DON acquisition programs to comply with MIL-STD 882D, Appendix A, related to sections that provide guidance to properly assign RACs and establish controls to ensure compliance.	O	ASN (RD&A)	12/30/10	²⁴
2	12	36	Promulgate policy to require, or revise existing policy that requires DON acquisition programs to: (1) assign an initial RAC (prior to considering mitigation solutions) at a level with a corresponding risk acceptance authority of Component Acquisition Executive (CAE) for all noise hazards that expose Sailors and Marines to hazardous levels of noise (according to OPNAVINST 5100.23G); and (2) maintain the RAC at that level until the noise hazard is mitigated below the level considered hazardous. If the noise hazard is not mitigated below the level considered hazardous, require the hazard to be formally accepted by both the User Representative and the CAE prior to deployment.	O	ASN (RD&A)	12/30/10	²⁴

²⁴ Actual target completion date will be provided by OASN (RD&A) with the 6- month status update. OASN (RD&A) stated that they will be able to provide a more accurate target completion date at that time considering actionees would have had time to actually define internal control processes, identify any needed changes, and have a plan to issue policy.

SECTION B: STATUS OF RECOMMENDATIONS

Finding ²²	Rec. No.	Page No.	Subject	Status ²³	Action Command	Interim Target Completion Date	Target Completion Date
2	13	37	Promulgate policy or revise existing policy to require program offices to: (1) develop mitigation solutions in collaboration with end users (using organization); and (2) obtain formal acceptance of mitigation from end-user solutions prior to reducing the RAC levels, especially when it involves changes to an end users' (e.g. Fleet command, etc.) concept of operations.	O	ASN (RD&A)	12/30/10 ²⁵	²⁴
2	14	37	Establish guidance that specifies the minimum information program offices are required to track, and establish controls to ensure that DON acquisition program offices maintain a current log of identified hazards and an assessment of residual mishap risk.	O	ASN (RD&A)	12/30/10	²⁴
2	15	38	Establish a plan of action and milestones to ensure that a noise threshold/goal is established for DON acquisition programs, especially for those with known noise hazards to meet, and include the threshold/goal as a requirement in the program's ORDs.	O	ASN (RDA) DCNO (N8) CMC	12/30/10 ²⁵	²⁴

²⁵ OASN (RD&A) did not identify an interim target completion date; therefore, the Naval Audit Service assigned a date 6 months from the date of publication.

Exhibit A:

Background

CVN 78 Aircraft Carrier

The Carrier Vessel Nuclear (CVN) 21 Program is the future aircraft carrier replacement program for the *USS Enterprise* and *Nimitz* Class Aircraft Carriers. According to the CVN 21 Program Office (Program Manager, Ship (PMS) 378), starting with the lead ship, *Gerald R. Ford* (CVN 78), the *Ford* class will retain the *Nimitz* Class hull. The *Ford* Class will consist of three aircraft carriers (CVN 78-80) which will be delivered between 2015 and 2023. The CVN 78 Aircraft Carrier will carry aircraft, including the Joint Strike Fighter and F/A-18E/F.

Figure 7: CVN 78 Aircraft Carrier



Source: <http://www.nn.northropgrumman.com>

According to a Naval Air Warfare Center Technical Report, dated 18 May 2006, those aircraft are expected to expose Sailors to noise levels between 148-152 decibels (dB) (steady-state noise levels exceeding 84 dB are considered hazardous). The CVN 78 Airborne Noise Control/Design History Booklet, dated 23 September 2008, included the following predicted airborne noise levels based on ship design data: engine rooms, 76-99 dB; Supervisory Operation Stations located in the engine room, 83-85 dB; and auxiliary rooms, 93-101 dB. Therefore, these compartments could exceed the steady-state noise limit of 84 dB, which, according to Chief of Naval Operations Instruction 5100.23G, is considered hazardous.

At the time of our review, the CVN 78 Aircraft Carrier was in the System Development and Demonstration (SDD) phase of the acquisition cycle. According to Department of Defense (DoD) Instruction 5000.2, dated 12 May 2003, SDD has two major efforts: System Integration and System Demonstration. System Integration is intended to integrate subsystems, complete detailed design, and reduce system-level risk. System Demonstration is intended to demonstrate the ability of the system to operate in a useful way consistent with the approved Key Performance Parameters. The next phase of the cycle is Production and Deployment.

Expeditionary Fighting Vehicle

The Expeditionary Fighting Vehicle (EFV) is an armored and tracked amphibious vehicle, capable of transporting Marines from Naval ships located beyond the visual horizon to inland locations. There are two variants of the EFV. The “Personnel Variant” is used to conduct amphibious operations and subsequent ground combat operations ashore. It has a crew of three, can carry 17 Marines ashore, and has a MK46 30 mm weapon station and a 7.62 mm coaxial machine gun. The “Command Variant” is used as a tactical command post, allowing commanders to

communicate with senior, adjacent, and subordinate maneuver units. EFV Program Office representatives provided the U.S. Army’s Center for Health Promotion and Preventive Medicine (CHPPM) EFV Health Hazard Assessment report, dated March 2007, which referenced test results conducted between December 2003 and March 2006, to support the following noise hazards related to the EFV:

- Steady-state noise levels ranged from 93 to 116.2 dB [steady-state noise levels exceeding 84 dB are considered hazardous]; and
- Impulse noise levels ranged from 134.5 to 176.9 dB [impulse noise levels exceeding 140 dB are considered hazardous].

According to the EFV Program Office, mitigation efforts have continued since the time of the CHPPM report, and noise levels have been further reduced.

At the time of our review, the EFV Program was in the SDD phase of the acquisition cycle, which began in Fiscal Year 2001, and the program had produced a second generation of prototype vehicles. EFV Program Office representatives stated that the program was restarting the SDD phase and would produce a third generation of prototype vehicles once a new contract is issued, which was awarded on 31 July 2008. The next phase of the cycle is Production and Deployment.

Figure 8: Expeditionary Fighting Vehicle



Source: <http://www.efv.usmc.mil/>

F/A-18E/F and EA-18G

According to the F/A-18E/F and EA-18G

Programmatic Environment, Safety, and Occupational Health Evaluation (PESHE),²⁶ dated March 2007, the F/A-18E (single seat)/F/A-18F (dual seat) variant is the third variant to the F/A-18 aircraft. It is a high-performance, twin engine, mid-wing, multi-mission, tactical aircraft designed to replace the F/A-18C (single seat), F/A-18D (dual seat), A-6E, and F-14 aircraft. According to Program Manager, Air (PMA) 265 representatives, the F/A-18E/F aircraft emits a maximum of 150 dB of noise (steady-state noise levels exceeding 84 dB

are considered hazardous). The F/A-18E/F variant is fielded and is in the Operations and Support phase (O&S) of the acquisition cycle. According to DoD Instruction 5000.2, the objective of the O&S phase is to execute a support program that meets operation support performance requirements and sustains the system in the most cost-effective manner over its total life cycle. This is the last phase of the acquisition cycle and will terminate with system disposal at the end of the useful life.

According to the PESHE, the EA-18G variant will be the fourth major variant of the F/A-18 aircraft and will serve as the Navy's replacement for the aging fleet of carrier-based EA-6Bs. According to PMA 265 representatives, the EA-18G aircraft will emit a maximum of 150 dB of noise. The EA-18G platform is a modified version of the F/A-18F platform equipped with weapon system upgrades and is being acquired through the Spiral Development acquisition process. According to DoD Instruction 5000.2, Spiral Development occurs when a desired capability is identified, but the end-state requirements are not known at program initiation. According to the F/A-18 PESHE, dated March 2007, the EA-18G Program was in Low-Rate Initial Production (LRIP) (Production and Deployment Acquisition Phase), which is beyond the SDD phase. DoD Instruction 5000.2 states that LRIP should result in adequate and efficient manufacturing capability to produce the minimum quantity of units necessary for Initial

Figure 9: F/A-18E/F



Source: <http://www.navy.mil>

²⁶ The document has three objectives: (1) to summarize the current status of the Environmental, Safety, and Occupational Health (ESOH) program, actions, and initiatives being undertaken by the F/A-18E/F and EA-18G Programs; (2) to formally identify ESOH issues that require near-term resolutions; and (3) to provide a roadmap for embedding ESOH into the program throughout its life cycle. According to Secretary of the Navy Instruction 5000.2C, the PESHE should include ESOH risks, a strategy for integrating responsibilities, a method for tracking progress, and a schedule for National Environmental Policy Act (NEPA) compliance.

Operational Test and Evaluation. Upon successful completion of operational testing, the next phase of the acquisition cycle will be full-rate production.

Joint Strike Fighter

The Joint Strike Fighter (JSF) Program is a DoD joint, multinational program that includes the Air Force, Navy, Marine Corps, and eight international partners as participants. According to the JSF Program Office (JPO), the JSF is a single-engine, single-seat, highly integrated air system that is designed to replace aging fighter inventories for the Air Force, Navy, and Marine Corps. There are three variants of the JSF: a conventional takeoff and landing variant for the Air Force, an aircraft carrier version for the Navy, and a short takeoff/vertical landing version for the Marine Corps. According to a Naval Air Warfare Center Technical Report, dated 18 May 2006, the JSF aircraft engine is predicted to produce 148-152 dB of noise depending on the power setting (steady-state noise levels exceeding 84 dB are considered hazardous).

At the time of our review, the JSF Program was in the SDD phase of the acquisition cycle. The SDD phase began when the contract was awarded in October 2001 and includes the development and testing of the entire aircraft system. The next phase of the cycle is Production and Deployment.

Figure 10: Joint Strike Fighter



Source: <http://www.lockheedmartin.com>

Small Business Innovative Research Program

The Small Business Innovation Research (SBIR) Program is a highly competitive three-phase award system which provides qualified small business concerns with opportunities to propose innovative ideas that meet the specific research and development needs of the Federal Government. The Department of the Navy funds the SBIR Program through a research, development, test and evaluation (RDT&E) tax on the Systems Command Program Executive Offices (PEOs). According to a SBIR representative, SBIR topics can be generated from a variety of sources, and final selection of topics is done by the PEOs. According to the representative, projects under the Navy SBIR program range from early stage to advanced technology, and are driven by the needs of specific PEOs and Systems Commands. According to the SBIR representative,

100 percent of the taxed funds are returned to the Systems Commands and each taxed organization within each Systems Command should receive at least 90 percent of their taxed amount for their allotted projects.

There are three phases of the SBIR process. During Phase I, a feasibility study is conducted to determine the scientific or technical merit of an idea or technology that may provide a solution to the Department of the Navy's need or requirement. Phase II is used as a demonstration phase in which prototypes are built and tested. During Phase III, the goal is to transition a company's SBIR efforts into products, tools, or services that benefit the Department of the Navy acquisition community.

Exhibit B:

Scope and Methodology

We conducted the audit of “Consideration of Safety and Occupational Health Issues in Acquisition of Major Department of Navy (DON) Weapon Systems and Platforms,” between 10 August 2007 and 4 December 2009. The audit included the following programs: Carrier Vessel Nuclear (CVN) 78 Aircraft Carrier, Expeditionary Fighting Vehicle (EFV), F/A-18E/F and EA-18G, and Joint Strike Fighter (JSF). Separate reports were issued on each system audited. Those reports contain additional details on our Scope and Methodology.

We assessed DON’s efforts to mitigate exposure to hazardous noise by conducting interviews with representatives from the Office of Naval Research (ONR), Naval Sea Systems Command (NAVSEA), Naval Air Systems Command (NAVAIR), and Marine Corps Systems Command (MARCORSYSCOM). We requested documentation to support all noise related research and development efforts, and analyzed the documentation. We also conducted interviews with representatives involved with the Deputy Assistant Secretary of the Navy (DASN) for Safety Global War on Noise initiative and the Naval Research Advisory Committee (NRAC) Tactical Jet Engine Noise Reduction Study.

We conducted interviews with program office Environmental, Safety, and Occupational Health (ESOH) representatives to:

- Determine if the noise level of the system posed a hazard; and
- Assess the program office’s process for mitigating identified noise hazards.

We conducted this performance audit in accordance with Generally Accepted Government Auditing Standards. Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objectives. We believe that the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives.

There were no prior audits relating to this subject; therefore, this audit does not include a followup review of past audit recommendations. The data quality was adequate for use in this audit.

Program Manager, Ship (PMS 378) - CVN 78 Aircraft Carrier

We conducted the audit of the “Consideration of Hazardous Noise in the Acquisition of the CVN 78 Aircraft Carrier” between 21 April 2008 and 11 February 2009. Specifically, we assessed PMS 378’s mitigation efforts related to the noise hazards. We conducted site visits and interviews with PMS 378 ESOH representatives at the Washington Navy Yard. We reviewed the Programmatic Environment, Safety, and Occupational Health Evaluation (PESHE); Operational Requirements Document (ORD); contract specifications; “As Delivered Engine Room (ER) and Auxiliary Room (AR) Airborne Noise Levels” Risk Information Sheet; ESOH Management Plan; CVN 78 Airborne Noise Control/Design History Booklet, dated 23 September 2008; Airborne Noise Habitability Improvements, dated July 2000; ship compartment listings from the most current CVN 78 and the CVN 77 General Arrangements; and official correspondence between PMS 378 and the contractor.

EFV Program Office - Expeditionary Fighting Vehicle

We conducted the audit of the “Consideration of Hazardous Noise and Vibration in the Acquisition of the Expeditionary Fighting Vehicle,” between 18 September 2007 and 19 September 2008. Specifically, we assessed the EFV Program Office’s mitigation efforts related to the “Personnel Exposure to Steady-State Noise” hazard and “Impulse Noise Exposure” hazard. We conducted site visits and interviews with EFV Program Office ESOH representatives in Woodbridge, VA, and Camp Pendleton, CA. We reviewed the PESHE; the Capability Production Documents; the “Personnel Exposure to Steady-State Noise” and “Impulse Noise Exposure” Hazard Action Reports; the EFV ESOH Hazard Approval/Risk Acceptance Procedures; EFV Safe and Ready letters; the U.S. Army’s CHPPM EFV Health Hazard Assessment report; the Bradley Fighting Vehicle Health Hazard Assessment; and design documentation.

Program Manager, Air (PMA 265) - F/A-18E/F and EA-18G

We conducted the audit of the “Consideration of Hazardous Noise in the Acquisition of the F/A-18E/F Super Hornet and EA-18G Growler Strike Fighter Variants” between 9 January 2008 and 14 August 2008. Specifically, we assessed the F/A-18 Program Office’s (PMA 265’s) mitigation efforts related to the flight deck noise hazard. We conducted site visits at NAVAIR in Patuxent River, MD, and interviews with the PMA 265 ESOH representatives. We reviewed the F/A-18 PESHE; the ORD; Safety Action Record hazard reports from the system safety hazard database; System Safety Program Plan; the Program Progress Report; the F/A-18 Acquisition Strategy; ESOH Statement of Work sections; ESOH memorandums; and engine noise mitigation studies and reports.

JSF Program Office (JPO) - Joint Strike Fighter

We conducted the audit of the “Consideration of Hazardous Noise in the Acquisition of the JSF” between 13 November 2007 and 16 October 2008. Specifically, we assessed JPO’s mitigation efforts related to the flight deck noise hazard. We conducted site visits at the Program Executive Office in Crystal City, VA, and interviews with JPO ESOH personnel and JSF Environment Acoustics Team members. We reviewed the PESHE; the JSF ORD; JSF contract specifications; and maintainer noise (flight deck noise) hazard analysis records from the hazard database.

Exhibit C:

Pertinent Guidance

Department of Defense (DoD) Instruction 5000.2, “Operation of the Defense Acquisition Systems,” dated 12 May 2003, Section E.7.1.6 states that the Component Acquisition Executive (CAE) is the risk acceptance authority for “High” ESOH [Environmental, Safety, and Occupational Health] mishap risks identified by the program, the Program Executive Officer (PEO)-level is the authority for “Serious” risks, and the Program Manager (PM) is the authority for “Medium” and “Low” risks.

DoD Instruction 5000.02, “Operation of the Defense Acquisition Systems,” dated 2 December 2008, canceled DoD Instruction 5000.2. Enclosure 12, Section 6 of the Instruction provides the following risk acceptance authority levels: CAE for “High” risks, PEO level for “Serious” risks, and the PM for “Medium” and “Low” risks.

Military Standard 882D (MIL-STD 882D), “Standard Practice for System Safety,” dated 10 February 2000, outlines a standard practice for conducting the DoD system safety approach and managing safety and health mishap risks in order to meet the DoD commitment to protecting private and public personnel from accidental death, injury, or occupational illness.

- Section 3.2.3, Definition of hazard: Any real or potential condition that can cause injury, illness, or death to personnel; damage to or loss of a system, equipment or property; or damage to the environment.
- Section 4.1c, Documentation of system safety approach: Document the developer’s and program manager’s approved system safety engineering approach. This documentation shall define how hazards and residual mishap risk are communicated to and accepted by the appropriate risk acceptance authority and how hazards and residual mishap risk will be tracked.
- Section 4.2, Identification of hazards: Identify hazards through a systematic hazard analysis process encompassing detailed analysis of system hardware and software, the environment (in which the system will exist), and the intended use or application. Consider and use historical hazard and mishap data, including lessons learned from other systems. Identification of hazards is a responsibility of all program members. During hazard identification, consider hazards that could occur over the system life cycle.
- Section 4.3, Assessment of mishap risk: Assess the severity and probability of the mishap risk associated with each identified hazard, i.e. determine the potential negative impact of the hazard on personnel, facilities, equipment, operation, the public, and the environment, as well as on the system itself.

- Section 4.4, Identification of mishap risk mitigation measures: Identify potential mishap risk mitigation alternatives and the expected effectiveness of each alternative or method. Mishap risk mitigation is an iterative process that culminates when the residual mishap risk has been reduced to a level acceptable to the appropriate authority. The system safety design order of precedence for mitigating identified hazards is:
 1. Eliminate hazards through design selection: If unable to eliminate an identified hazard, reduce the associated mishap risk to an acceptable level through design selection;
 2. Incorporate safety devices: If unable to eliminate the hazard through design selection, reduce the mishap risk to an acceptable level using protective safety features or devices;
 3. Provide warning devices: If safety devices do not adequately lower the mishap risk of the hazard, include a detection and warning system to alert personnel to the particular hazard; and
 4. Develop procedures and training: Where it is impractical to eliminate hazards through design selection or to reduce the associated risk to an acceptable level with safety and warning devices, incorporate special procedures and training. Procedures may include the use of personal protective equipment.
- Section 4.8, Tracking of hazards, their closures, and residual mishap risk: Track hazards, their closure actions, and the residual mishap risk. Maintain a tracking system that includes hazards, their closure actions, and residual mishap risk throughout the system life cycle. The program manager shall keep the system user advised of the hazards and residual mishap risk.
- Section A.4.4.3.2.2, Mishap probability: Mishap probability is the probability that a mishap will occur during the planned life expectancy of the system. It can be described in terms of potential occurrences per unit of time, events, population, items, or activity.
- Section A.4.4.5, Reduction of mishap risk to an acceptable level: Reduce the system mishap risk through a mitigation approach mutually agreed to by the developer, program manager, and the using organization.
- Section A.4.4.8.1, Process for tracking of hazards and residual mishap risk: Each system must have a current log of identified hazards and residual mishap risk, including an assessment of the residual mishap risk. As changes are integrated into the system, this log is updated to incorporate added or changed hazards and the associated residual mishap risk. The Government must formally acknowledge acceptance of system hazards and residual mishap risk. Users will be kept informed of hazards and residual mishap risk associated with their systems.

- Section A.4.4.8.1.2, Program manager responsibilities for communication, acceptance, and tracking of hazards and residual mishap risk: The program manager will evaluate the hazards and associated residual mishap risk in close consultation and coordination with the ultimate end user, to assure that the context of the user requirements, potential mission capability, and the operational environment are adequately addressed.

Secretary of the Navy Instruction (SECNAVINST) 5000.2C, “Implementation and Operation of the Defense Acquisition System and the Joint Capabilities Integration and Development System,” dated 19 November 2004, Enclosure 7, Section 7.3 includes the risk categories and risk acceptance authority levels included in the table below. SECNAVINST 5000.2C further states that risk acceptance authority may not be delegated below the PM.

Table 3: SECNAVINST 5000.2C Risk Categories and Risk Acceptance Authority Levels

Probability Severity	Frequent (A)	Probable (B)	Occasional (C)	Remote (D)	Improbable (E)
Catastrophic (I)	High	High	High	Serious	Medium
Critical (II)	High	High	Serious	Medium	Medium
Marginal (III)	Serious	Serious	Medium	Medium	Medium
Negligible (IV)	Medium	Medium	Low	Low	Low

Risk Level	Risk Acceptance Authority
HIGH	Component Acquisition Executive (CAE) Assistant Secretary of the Navy for Research, Development and Acquisition (ASN (RD&A))
SERIOUS	Program Executive Officer (PEO)/Systems Command Commanders, or Flag -Level or Senior Executive Service (SES) designees or Direct Reporting Program Manager (DRPM)
MEDIUM	Program Manager (PM)
LOW	PM

SECNAVINST 5000.2D, “Implementation and Operation of the Defense Acquisition System and the Joint Capabilities Integration and Development System,” dated 16 October 2008, canceled SECNAVINST 5000.2C. Enclosure 7, Section 7.3 of the Instruction includes the following acceptance authority levels: ASN (RD&A) for “High” risks; PEOs/Systems Command Commanders, or Flag-level or SES designees, DRPMs, and Chief of Naval Research (CNR) are the risk acceptance authorities for “Serious” risks; and PMs for “Medium” and “Low” risks.

Office of the Chief of Naval Operations Instruction (OPNAVINST) 5100.23G, “Navy Safety and Occupational Health (SOH) Program Manual,” dated 30 December 2005, Section 1801a, states that occupational hearing loss resulting from exposure to hazardous noise, the high cost of related compensation claims, and the resulting drop in productivity and efficiency, highlight a significant problem that requires considerable attention. Noise control and hearing conservation measures contribute to operational readiness by preserving and optimizing auditory fitness for duty in Navy personnel. The instruction defines a potentially hazardous noise area as any work area where the A-weighted sound level (continuous or intermittent) is greater than 84 dB.

Exhibit D:

Activities Visited and/or Contacted

Assistant Secretary of the Navy for Installations and Environment, Arlington, VA*

ASN for Research, Development and Acquisition, Arlington, VA*

Board of Inspection and Survey, Norfolk, VA*

Bureau of Medicine and Surgery, Washington, DC*

Commander, Fleet Forces Command, Norfolk, VA

Commander, U.S. Pacific Fleet, Pearl Harbor, HI

Deputy Assistant Secretary of the Navy (DASN) Acquisition and Logistics Management, Arlington, VA*

DASN (Air), Arlington, VA*

DASN (Environment), Arlington, VA*

DASN (Safety), Arlington, VA*

Expeditionary Fighting Vehicle (EFV) Program Office, Woodbridge, VA*

EFV Amphibious Vehicle Test Branch, Camp Pendleton, CA*

Joint Strike Fighter Program Office, Crystal City, VA*

Marine Corps Systems Command, Quantico, VA*

Naval Air Forces, San Diego, CA

Naval Air Systems Command (NAVAIR), Patuxent River, MD*

NAVAIR 4.4, Propulsion and Power, Patuxent River, MD*

Naval Sea Systems Command, Washington, DC*

Navy Environmental Health Center (now Navy and Marine Corps Public Health Center), Portsmouth, VA*

Navy Medical Center - Industrial Hygiene Office, San Diego, CA*

Office of Naval Research, Arlington, VA*

Office of the Chief of Naval Operations Director Air Warfare (OPNAV N88), Arlington, VA*

OPNAV Safety Liaison Office (OPNAV N09FB), Arlington, VA*

Program Manager, Air (PMA) 202, Patuxent River, MD*

PMA 265, Patuxent River, MD*

Program Manager, Ship (PMS) 312, Washington, DC*

PMS 378, Washington, DC*





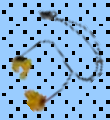





U.S. Air Force Research Lab, Wright-Patterson Air Force Base, Westerville, OH

Vice Chief of Naval Operations, Arlington, VA*

*Activities Visited

Exhibit E:

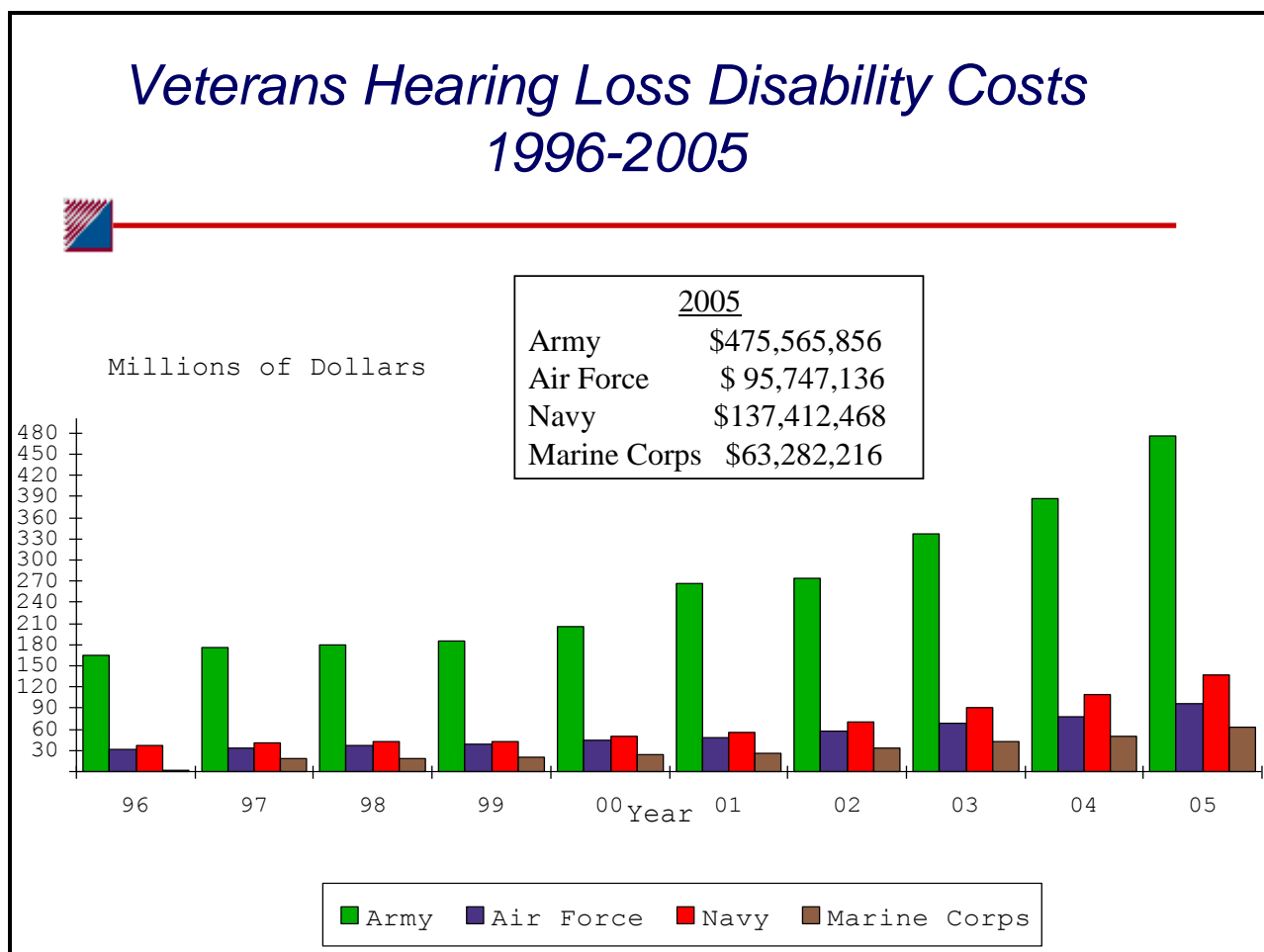
Hearing Protection Suite

<div></div> <h1>Hearing Protection Roadmap</h1>				
CURRENT		NEAR-TERM		FUTURE
Components	Integrated	Components	Integrated	Integrated
<div><div><p>Hearing protection using foam type devices varies depending on properly wearing both earplugs</p></div><div><p>21 dB Mean Attenuation Legacy Earmuff</p><p>22 dB Mean Attenuation Legacy Foamy Earplugs</p></div><div></div></div>	<p>30 dB Mean Attenuation Legacy Earmuff + Legacy Foamy Earplugs</p> <div></div>	<div><p>25 dB Mean Attenuation Improved Earmuff</p><p>28 dB Mean Attenuation Foam Tip Mini-Comm Earplug (CEP)</p><p>29 dB Mean Attenuation Custom Molded Deep Insert Earplug</p></div> <div></div>	<p>43 dB Mean Attenuation Improved Earmuff + Custom Molded Deep Insert Earplug w/ or w/o Communication</p> <div></div>	<p>50 dB Mean Attenuation Active Noise Reduction (ANR) + Improved Earmuff + Custom Molded Deep Insert Earplug w/ or w/o Communication</p> <div></div>
Legacy Cranial		Flight Deck Cranial Program		
<div><p>1. Naval personnel correctly wearing both Legacy Foamy Earplugs = 7%, results in 22 dB protection.</p><p>2. Naval personnel with shallow insertion or not wearing Legacy Foamy Earplugs = 79%, results in 0-6 dB protection.</p></div> <div></div>				

Source: PMA 202, "Flight Deck Cranial Status Brief to the Navy Executive Safety Board (NESB)," 25 March 2008.

Exhibit F:

Center for Naval Analyses Veterans Hearing Loss Disability Costs



Source: Center for Naval Analyses, "Computing the Return on Noise Reduction Investments in Navy Ships: A Life-Cycle Cost Approach," September 2006.

Exhibit G:

Risk Matrices

Secretary of the Navy Instruction 5000.2C Risk Matrix and Risk Acceptance Authority Levels

Probability Severity	Frequent (A)	Probable (B)	Occasional (C)	Remote (D)	Improbable (E)
Catastrophic (I)	High	High	High	Serious	Medium
Critical (II)	High	High	Serious	Medium	Medium
Marginal (III)	Serious	Serious	Medium	Medium	Medium
Negligible (IV)	Medium	Medium	Low	Low	Low

Risk Level	Risk Acceptance Authority
HIGH	Component Acquisition Executive (CAE) (ASN (RD&A))
SERIOUS	Program Executive Officer (PEO)/SYSCOM Commanders, or Flag -Level or Senior Executive Service (SES) designees or Direct Reporting Program Manager (DRPM)
MEDIUM	Program Manager (PM)
LOW	PM

EFV Program Office Risk Matrix and Risk Acceptance Authority Levels

Severity Probability	Catastrophic (I)	Critical (II)	Marginal (III)	Negligible (IV)
Frequent (A)	IA	IIA	IIIA	IVA
Probable (B)	IB	IIB	IIIB	IVB
Occasional (C)	IC	IIC	IIIC	IVC
Remote (D)	ID	IID	IIID	IVD
Improbable (E)	IE	IIE	IIIE	IVE

Risk Level	Risk Acceptance Authority
HIGH RACs: IA-IC, IIA-IIB & IIIA	ASN (RD&A)
SERIOUS RACs: ID, IIC-IIID & IIIB-IIIIC	DRPM
MEDIUM RACs: IE, IIE, IIID-IIIE & IVA-IVB	ESOH Advisory Board
LOW RACs: IVC-IVE	ESOH Working Groups

PMA265 Risk Matrix and Risk Acceptance Authority Levels

Consequence Likelihood	Negligible (I)	Minor (II)	Moderate (III)	Critical (IV)	Severe (V)
Near Certain (E)	Low Acceptable w/review	Serious Undesirable	High Unacceptable	High Unacceptable	High Unacceptable
Highly Likely (D)	Low Acceptable w/review	Medium Undesirable	Serious Undesirable	High Unacceptable	High Unacceptable
Likely (C)	Low Acceptable w/review	Medium Undesirable	Medium Undesirable	Serious Undesirable	High Unacceptable
Low Likelihood (B)	Low Acceptable w/o review	Low Acceptable w/review	Low Acceptable w/review	Medium Acceptable w/review	Serious Undesirable
Not Likely (A)	Low Acceptable w/o review	Low Acceptable w/o review	Low Acceptable w/review	Low Acceptable w/review	Medium Acceptable w/review

Risk Level	Risk Acceptance Authority
High-Unacceptable RACs: VC-VE, IVD-IVE & IIIE	Component Acquisition Executive (CAE)
Serious- Undesirable RACs: VB, IVC, IIIC & IIE	Program Executive Officer (PEO)
Medium- Undesirable/ Medium- Acceptable w/ Review RACs: VA, IVB, IIID & IIC-IIID	PMA265 PM or F/A-18E/F & EA-18G PM
Low-Acceptable w/Review RACs: IVA, IIIA-IIIB, IIB & IC-IE	F/A-18E/F & EA-18G PM or designee
Low-Acceptable w/o Review RACs: IIA & IA	F/A-18E/F & EA-18G PM or designee


JPO Risk Matrix and Risk Acceptance Authority Levels

Probability Severity	Frequent	Probable	Occasional	Remote	Improbable
Catastrophic (I)	1	2	4	8	11
Critical (II)	3	5	6	10	15
Marginal (III)	7	9	12	14	17
Negligible (IV)	13	16	18	19	20

Risk Level	Risk Acceptance Authority
HIGH RACs: 1-3	CAE
SERIOUS RACs: 4-7	PEO or equivalent
MEDIUM RACs: 8-10	JPO PM or equivalent
LOW RAC: 11	JPO PM or designee
VERY LOW RACs: 12-20	Acceptable

Appendix 1:

Management Response from Office of the Assistant Secretary of the Navy (Research, Development and Acquisition)

	<p>DEPARTMENT OF THE NAVY OFFICE OF THE ASSISTANT SECRETARY (RESEARCH, DEVELOPMENT AND ACQUISITION) 1000 NAVY PENTAGON WASHINGTON, DC 20350-1000</p>	<p>MAR 22 2010</p>
<p>MEMORANDUM FOR ASSISTANT AUDITOR GENERAL FOR INSTALLATIONS AND ENVIRONMENT AUDITS</p>		
<p>Subj: CONSIDERATION OF HAZARDOUS NOISE IN THE ACQUISITION OF SELECTED MAJOR DEPARTMENT OF THE NAVY WEAPON SYSTEMS AND PLATFORMS</p>		
<p>Ref: (a) NAS Draft Report No. N2007-NIA000-0066 of Dec 4, 2009</p>		
<p>Encl: (1) Summary of Recommendations and Actions NAS Draft Report N2007- NIA000-0066 Draft Report</p>		
<p>In response to reference (a), enclosure (1) is provided listing the OASN (RDA) comments, recommendations and status of action taken. Questions concerning this memorandum should be directed to [REDACTED] OASN (RDA) A&LM, who can be reached at [REDACTED] or [REDACTED]</p>		
<p>[REDACTED]</p>		
<p>[REDACTED]</p>		
<p>Executive Director DASN Acquisition & Logistics Management</p>		
<p>Copy to: ASN(I&E) CNO (N09FB, N4) COMFLTFORCOM DASN(AIR) DASN(EXW) DASN(SHIPS) PEO(C4I and Space) PEO(IWS) PEO(LMW) PEO(T) PEO(U&W) BUMED AIR OOG4 SEA 00N3C</p>		

FOIA (b)(6)

FOIA (b)(6)

DEPARTMENT OF THE NAVY RESPONSE TO RECOMMENDATIONS
REGARDING NAS DRAFT REPORT ON CONSIDERATION OF
HAZARDOUS NOISE IN THE ACQUISITION OF SELECTED MAJOR
DEPARTMENT OF THE NAVY WEAPON SYSTEMS AND PLATFORMS
(NO. N2007-NIA000-0066)

We recommend that ASN (RD&A):

Recommendation 1. Coordinate with the Chief of Naval Operations (CNO) (Deputy Chief of Naval Operations (DCNO) for Fleet Readiness and Logistics (N4), DCNO (Integration of Capabilities & Resources) (N8), Commander, Fleet Forces Command, and OPNAV Safety Liaison Office (N09FB)); Commandant of the Marine Corps; and ASN (I&E) to establish a central DON body, with responsibility and authority for the actions discussed in the finding, to manage efforts to mitigate exposure to hazardous noise throughout DON organizations.

OASN(RDA) Comments:

Concur. OASN(RDA) agrees formation and continued active engagement of a central DON body to manage hazardous noise risks is appropriate. Upon completion of the NAS final report on this subject and subsequent agreement of DON comments, OASN(RD&A) will pursue development of such central DON group. OASN (RD&A) will strive for a target establishment date of 30 DEC 10. OASN (RD&A) will provide the status of this action to NAS within six months of issuance of the final report. This status update will include a consolidated DON response addressing progress establishing the recommended central DON group.

Recommendation 6. Establish internal management controls and provide oversight to verify that all acquisition programs in their purview officially identify and assess known/recognized noise hazards early in the acquisition process.

OASN(RDA) Comments:

Concur. The current draft SECNAVINST 5000.2E requires program managers to manage Environment Safety and Occupational Health (ESOH) risks for their system's life cycle using the methodologies described in the DoD Standard Practice for System Safety (MIL-STD 882D). These areas are program dependent and include, but are not limited to, noise, vibration, human factors, etc. This update also requires PMs to include in the Acquisition Strategy, a summary of the Programmatic ESOH Evaluation (PESHE) including ESOH hazards and associated risks, proposed mitigation plans, and a strategy for integrating ESOH considerations, including technology, into the systems engineering process. Considering the unpredictable nature of staffing such a complex policy document,

OASN (RD&A) would estimate at least an interim release of SECNAVINST 5000.2E by 30 SEP 2010. Should this estimate not bear out, OASN (RD&A) would pursue issuing a policy memo indicating the required use of MIL-STD 882D as discussed above.

As an internal control process, per Systems Engineering Technical Review (SETR) policy promulgated January 19, 2010, Technical Review Boards (TRBs) will be conducted for each SETR. The SYSCOM CHSENG will assign, in writing, a senior Government employee, independent of the program to chair the TRB. Selection of the chair is typically from the technical authority chain and is a senior individual with technical expertise relevant to the program. In addition, the Six-Gate review process has been significantly expanded in requirements necessary to complete each review. One such requirement is that the PM address program risk during the pre-Milestone A review. The PM is also required to include the results of the SETR event and technical risk assessment pertaining to that Gate Review.

Recommendation 7. Establish internal management controls and provide oversight to ensure that DON acquisition programs include the threshold/goal requirements (noted in Recommendation 15) in their respective contracts within the Materiel Solution Analysis, Technology Development, and Engineering and Manufacturing Development phases.

OASN(RDA) Comments:

Concur. OASN(RDA) acknowledges internal management controls are necessary to ensure compliance with updated guidance relative to hazardous noise exposure. This is particularly so, when ensuring our programs comply with this guidance across the life cycle of a program. Improvements to the Six-Gate review process are underway and include significantly expanded entrance and exit criteria for reviews across the Materiel Solution Analysis, Technology Development, Engineering and Manufacturing Development, and Sustainment life cycle phases. The Systems Design Specification plays an important role in these process improvements. The SDS is the end result of flowing down the CDD performance requirements into a document that specifies the functional requirements and major programmatic actions required to deliver the system. ESOH Requirements are captured in the SDS.

The improved Six Gate process, which has been expanded to strengthen the posture of the Systems Engineering Process and the associated technical and safety risks as assessed by the independent technical authority, is pending formal release in SECNAV 5000.2E. For the next update of the Six Gate review process, DASN(A&LM), CHSENG, and DASN(Safety) will coordinate to incorporate an increased focus on compliance with guidance for exposure to hazardous noise.

OASN(RDA) will provide the status of this action to NAS within six months of issuance of the final report.

Recommendation 8. Establish and implement controls and provide oversight to ensure that the System Safety Design Order of Precedence is followed during the acquisition process to ensure that, where possible, concerns such as hazardous noise are mitigated early in the process through system design.

OASN(RDA) Comments:

Concur. OASN(RDA) recognizes the increasing importance of engineering noise reduction designs into our systems early in the development process to avoid the various long-term implications. ASN(RDA) CHSENG and DASN(A&LM) will coordinate with ASN(I&E), DASN (Safety) to establish such controls and implement oversight to ensure the System Safety Design Order of Precedence is followed during acquisition program life cycle. This coordination will explore ways to link appropriate hazardous noise mitigation policy to internal controls via an updated Six-Gate review process or other existing appropriate internal control processes. OASN(RDA) will provide the status of this action to NAS within six months of issuance of the final report.

Recommendation 9. Revise SECNAVINST 5000.2D to: (1) require the use of a single risk matrix with consistent risk categories and associated definitions and terms for all DON acquisition programs, or by like programs, to follow when evaluating risks; (2) establish uniform guidance for setting risk acceptance authority levels; and (3) prohibit delegation of risk acceptance authority below the Program Manager level.

OASN(RDA) Comments:

Concur. DASN(A&LM) will work with DASN (Safety) to develop guidance requiring the use of a single risk matrix with consistent risk categories and associated definitions and terms for all DON acquisition programs to follow when evaluating risks. This development effort will also establish uniform guidance for setting risk acceptance authority levels and prohibit delegation of risk acceptance authority below the Program Manager level. OASN (RD&A) will provide the status of this action to NAS within six months of issuance of the final report.

Recommendation 10. Establish controls and provide oversight early in the acquisition process to ensure that program offices properly establish risk acceptance authority levels in accordance with the revised SECNAVINST 5000.2D.

OASN(RDA) Comments:

Concur. OASN(RDA) realizes oversight of proper risk acceptance must be improved to increase our focus in this area. DASN(A&LM), DASN(Safety), OPNAV N4, OPNAV N8, and RDA CHSENG will work together to incorporate verification of risk acceptance (and associated authority) into the next update of the SECNAVINST 5000.2 and also explore ways to include this in the next update of the Six-Gate review process. OASN(RDA) will provide the status of this action to NAS within six months of issuance of the final report.

Recommendation 11. Promulgate policy to require, or revise existing policy that requires DON acquisition programs to comply with MIL-STD 882D, Appendix A, related to sections that provide guidance to properly assign RACs and establish controls to ensure compliance.

OASN(RDA) Comments:

Concur. SECNAVINST 5000.2D sets policy for compliance with MIL-STD 882D. OASN(RDA) agrees internal controls must be in-place to ensure such compliance. DASN (A&LM) will coordinate with DASN (Safety) in defining and/or developing such internal controls and provide implementation recommendations. This effort will include exploring existing internal controls that lend themselves appropriately to oversight of MIL-STD 882D compliance. OASN(RDA) will provide the status of this action to NAS within six months of issuance of the final report.

Recommendation 12. Promulgate policy to require, or revise existing policy that requires DON acquisition programs to: (1) assign an initial RAC (prior to considering mitigation solutions) at a level with a corresponding risk acceptance authority of Component Acquisition Executive (CAE) for all noise hazards that expose Sailors and Marines to hazardous levels of noise (according to OPNAVINST 5100.23G); and (2) maintain the RAC at that level until the noise hazard is mitigated below the level considered hazardous. If the noise hazard is not mitigated below the level considered hazardous, require the hazard to be formally accepted by both the User Representative and the CAE prior to deployment.

OASN(RDA) Comments:

Concur. SECNAVINST 5000.2D requires compliance with MIL-STD-882D, designates risk acceptance authorities, and requires the user representative be a part of the risk acceptance process throughout the system life cycle and provide formal concurrence prior to all Serious- and High-risk acceptance decisions.

OASN(RDA) recognizes the need for oversight to ensure noise hazards have been mitigated below levels considered hazardous. DASN(A&LM), DASN(Safety) and RDA CHSENG will coordinate to develop policy indicating the CAE shall be the risk acceptance authority for hazardous noise exposure of Sailors and Marines until such time that the noise exposure is no longer considered hazardous, according to provisions set forth in OPNAVINST 5100.23G. This policy and an associated update to the Six-Gate review internal control process will be incorporated in the next update of SECNAVINST 5000. OASN(RDA) will provide the status of this action to NAS within six months of issuance of the final report.

Recommendation 13. Promulgate policy or revise existing policy to require program offices to: (1) develop mitigation solutions in collaboration with end users (using organization); and (2) obtain formal acceptance of mitigation from end-user solutions prior to reducing the RAC levels, especially when it involves changes to an end users' (e.g. Fleet command, etc.) concept of operations.

OASN(RDA) Comments:

Concur. The current update of SECNAVINST 5000.2 requires effective ESOH efforts encompass establishing ESOH responsibilities within and acquisition program's organizational structure; developing strategies to ensure compliance with ESOH regulatory requirements; identifying and tracking the mitigation of ESOH hazards and associated risks; and formally accepting and communicating identified ESOH risks and their associated mitigations, including obtaining formal user representative concurrence on high and serious risks. The updated Six-Gate review process supplements these requirements such that each Gate review assesses program health, including risks and associated mitigation.

Recommendation 14. Establish guidance that specifies the minimum information program offices are required to track, and establish controls to ensure that DON acquisition program offices maintain a current log of identified hazards and an assessment of residual mishap risk.

OASN(RDA) Comments:

Concur. OASN(RDA) will coordinate with DASN(Safety) to determine the most effective way to issue such guidance. Current internal control processes such as Independent Logistics Assessments, Systems Engineering Technical Reviews, and the Gate Review process will be considered as appropriate mechanisms to ensure compliance with guidance to be developed in response to this recommendation. OASN(RDA) will provide the status of this action to NAS within six months of issuance of the final report.

Appendix 2:

Management Response from Deputy Chief of Naval Operations, Integration of Capabilities and Resources (N8)



DEPARTMENT OF THE NAVY
OFFICE OF THE CHIEF OF NAVAL OPERATIONS
2006 NAVY PENTAGON
WASHINGTON, DC 20350-2006

7510
Ser N8/10U159031
22 Mar 10

From: Deputy Chief of Naval Operations, Integration of Capabilities and Resources (N8)
To: Assistant Auditor General, Installations and Environment Audits
Subj: CONSIDERATION OF HAZARDOUS NOISE IN THE ACQUISITION OF SELECTED MAJOR DEPARTMENT OF THE NAVY WEAPON SYSTEMS AND PLATFORMS (DRAFT AUDIT REPORT N2007-NIA000-0066)
Ref: (a) NAVAUDSVC memo N2007-NIA000-0066 of 04 December 2009
(b) SECNAVINST 7510.7F
Encl: (1) Deputy Chief of Naval Operations, Integration of Capabilities and Resources (N8) Response

1. The subject request forwarded by reference (a) has been reviewed. The requested response is provided as enclosure (1). The attached comments have been coordinated with the Director, Assessment Division (OPNAV N81).

[Redacted Signature]

Vice Admiral, U.S. Navy

FOIA (b)(6)

NAVAUDSVC DRAFT REPORT N2007-NIA000-0066

Recommendation 15:

Establish a plan of action and milestones to ensure that a noise threshold/goal is established for DON acquisition programs, especially for those with known noise hazards to meet, and include the threshold/goal as a requirement in the program's ORDs.

Response:

OPNAV N8 concurs with the recommendation, and assesses that current guidance and processes allow for better management of exposure to hazardous noise within Navy's capabilities development process. We assume Naval Audit Service's use of the term 'ORD' (Operational Requirements Document) in this recommendation was meant to address any formal requirements/capabilities documentation, with ORD used as blanket terminology.

The Manual for the Operation of the Joint Capabilities Integration and Development System (JCIDS Manual) defines the content of Capabilities Development Documents (CDD) and Capabilities Production Documents (CPD). Human Systems Integration (HSI) and related safety issues are both specifically identified in the JCIDS Manual as content to be addressed within Section 15 (Other System Attributes) of the CDD and CPD. Providing threshold and objective values for Other System Attributes is permissible, but rarely done.

OPNAVINST 5310.23 for Navy Personnel Human Systems Integration (NAVPRINT), signed by OPNAV N1, provides specific guidance for addressing HSI and related safety issues within Navy JCIDS documentation.

Navy's JCIDS review and approval process allows for Other System Attributes to be elevated to either Key System Attributes (KSAs) or Key Performance Parameters (KPPs) when deemed appropriate by leadership. OPNAV N09F and OPNAV N1 are asked to review and comment during every Navy JCIDS document review.

OPNAV N8 will continue to work with ASN(RD&A) to ensure all organizations are engaged in the Navy's document review and approval process, and that requirements minimizing noise hazards are better managed via the Navy's capabilities boards and Two-Pass/Six-Gate review process.

This report does not contain information deemed to be exempt from release under FOIA.

Enclosure (1)

Appendix 3:

Management Response from Commandant of the Marine Corps



DEPARTMENT OF THE NAVY
HEADQUARTERS UNITED STATES MARINE CORPS
3000 MARINE CORPS PENTAGON
WASHINGTON, DC 20350-3000

IN REPLY REFER TO:
7510
RFR-80
24 Mar 10

MEMORANDUM FOR ASSISTANT AUDITOR GENERAL INSTALLATIONS AND
ENVIRONMENT AUDITS

Subj: NAVAL AUDIT SERVICE (NAS) DRAFT REPORT N2007-NIA000-
0066, "CONSIDERATION OF HAZARDOUS NOISE IN THE
ACQUISITION OF SELECTED MAJOR DEPARTMENT OF THE NAVY
WEAPON SYSTEMS AND PLATFORMS"

Ref: (a) NAS memorandum of 4 December 2009

Encl: (1) Marine Corps official comments

1. In accordance with reference (a), the Marine Corps has
reviewed the subject draft report and provides comments at the
enclosure.

2. For questions regarding this response, you may contact
[REDACTED] Headquarters U. S. Marine Corps Audit Liaison
Officer, at [REDACTED] or email
HQMCAuditLiaisons@usmc.mil.

FOIA (b)(6)

[REDACTED]
[REDACTED]
By direction
of the Commandant,
United States Marine Corps

NAVAL AUDIT SERVICE (NAS) DRAFT REPORT DATED 4 DECEMBER 2009
PROJECT # N2009-NIA000-0066

"Consideration of Hazardous Noise in the Acquisition of Selected
Major Department of the Navy Weapon Systems and Platforms"

UNITED STATES MARINE CORPS COMMENTS
TO NAS RECOMMENDATIONS

RECOMMENDATION 4: Establish a plan of action and milestones to identify the earliest and most feasible opportunity, upon Marines' entry into service, to fit and issue the appropriate and most effective form of hearing protection to Marines in Military Occupational Specialties known to be exposed to hazardous noise.

USMC RESPONSE: Concur. Plan of action and milestones to identify the earliest and most feasible opportunity, upon Marines' entry into service, to fit and issue the appropriate and most effective form of hearing protection to Marines in Military Occupational Specialties known to be exposed to hazardous noise will be included in the update/revision to the current Marine Corps Order 6260.1E, "MARINE CORPS HEARING CONSERVATION PROGRAM." The plan of action and milestones shall focus on implementation of hearing readiness at entry level training for officers and enlisted along with material solutions. This revision is dependant on the ASN (RD&A) guidance to establish a central DON body, with responsibility and authority to manage efforts to mitigate exposure to hazardous noise throughout DON organizations. Estimated target completion date is 30 December 2010. Marine Corps will continue to provide interim updates every six (6) months effective 4 July 2010.

RECOMMENDATION 5: Establish a plan of action and milestones to fit and issue the appropriate and most effective form of hearing protection as part of the uniform to all Marines already in Military Occupational Specialties known to be exposed to hazardous noise.

USMC RESPONSE: Concur. Plan of action and milestones to fit and issue the appropriate and most effective form of hearing protection as part of the uniform to all Marines already in Military Occupational Specialties known to be exposed to hazardous noise will be included in the update/revision to the current Marine Corps Order 6260.1E, "MARINE CORPS HEARING CONSERVATION PROGRAM." Plan of action and milestones will include the use of education and leadership's focus on knowledge and value of hearing readiness upon entry into the Marine Corps and enforcement throughout one's service, as well as technology

improvements. This revision is dependant on the ASN (RD&A) guidance to establish a central DON body, with responsibility and authority to manage efforts to mitigate exposure to hazardous noise throughout DON organizations. Estimated target completion date is 30 December 2010. Marine Corps will continue to provide interim updates every six (6) months effective 4 July 2010.

RECOMMENDATION 15: Establish a plan of action and milestones to ensure that a noise threshold/goal is established for DON acquisition programs, especially for those with known noise hazards to meet, and include the threshold/goal as a requirement in the program's capabilities documents.

USMC RESPONSE: *Concur.* Plan of action and milestones to ensure that a noise threshold/goal is established for DON acquisition programs, especially for those with known noise hazards to meet, and include the threshold/goal as a requirement in the program's capabilities documents are currently being reviewed. Actions will include continued process improvements; implementation and oversight of the human systems integration to ensure hearing readiness. Future efforts will be dependant on the ASN (RD&A) guidance to establish a central DON body, with responsibility and authority to manage efforts to mitigate exposure to hazardous noise throughout DON organizations. Estimated target completion date is 30 December 2010. Marine Corps will continue to provide interim updates every six (6) months effective 4 July 2010.

Additional Comments on the report and it's recommendations:

▪ **Recommendation 4:** Currently upon entry into service Marines (officers and enlisted) receive baseline hearing test. Identifying best time for detailed training and fitting of hearing protection will require collaboration between Marine Corps Recruiting Command, Marine Corps Training and Education Command as well as coordination with supporting Bureau of Medicine and Surgery medical treatment facilities to support the hearing readiness and conservation program. In addition the time to properly train and fit hearing protection is prior to the exposure to hazardous noise.

The effectiveness of hearing protection resides with senior leaders (SNCOs and above) emphasis by example and enforcement. Marines and Sailors are punishable under the UCMJ when they fail to practice hearing readiness and do not wear hearing protection in noise hazardous environments. This may also be considered misconduct during line of duty determinations. Hearing readiness training and proper fitting must compliment issuing hearing protection devices.

While a concurrence is possible and engineering controls and technology are reducing weapon systems' and platforms' noise hazards, sound pressure levels remain too high for unprotected exposure. Therefore the Marine Corps must continue its hearing readiness program that includes noise attenuation devices; isolation; training; fitting; monitoring; and enforcement to mitigate the effects of noise.

▪ **Recommendation 5:** Marines and Sailors currently are required to carry specific ear protection while in combat and training environments per MCO P1020.34G. The fit and issue of appropriate and effective forms of hearing protection by MOS assumes detailed knowledge of sound frequencies, sound pressures, and length of exposure. Currently this level of detail requires continued data collection by the Bureau of Medicine and Surgery industrial hygiene program. Policy requires Marines be fitted and issued hearing protection based on noise exposure.

Current in service hearing protection devices include National Institute of Occupational Safety and Health (NIOSH) or Environmental Protection Agency noise reduction rated ear plugs, muffs, the QuietPro tactical headset for infantry and communication MOSs, improved combat vehicle crewman's helmet for combat vehicle MOSs, and cranials and aviation helmets for aviation MOSs.

Research and development continue advancements in hearing protection with better noise attenuation, situational awareness

and comfort being a known requirement for user acceptance. An enhancement to current hearing protection systems continues to be a priority.

A long term material solution together with hearing readiness training and enforcement will support a full solution.

▪ Recommendation 15: Human systems integration in conjunction with MIL-STD-882 provides a framework that was not resident during the early acquisition phases of the Expeditionary Fighting Vehicle (EFV) contained in this Naval Audit Service report. Acquisition programs balance cost, schedule, and performance with cost as an independent variable. Human systems integration policies were institutionalize per DoD Inst 5000.02 (Operation of the Defense Acquisition System) dated 02 December 2008, SECNAVINST 5000.2D (Implementation and Operation of the Defense Acquisition System and the Joint Capabilities Integration and Development System) dated 16 October 2008.

The current framework requires human systems integration requirements in all JCIDS documents, through all phases of the acquisition process, and during operation and support of the material solution for operating forces.

Objective threshold and sound pressure level goals will be established based on available technologies. The foremost goal is to mitigate sound pressure levels and when not feasible design hearing protection systems to reduce hazards to acceptable risks.

~~FOR OFFICIAL USE ONLY~~

Use this page as

BACK COVER

for printed copies
of this document

~~FOR OFFICIAL USE ONLY~~